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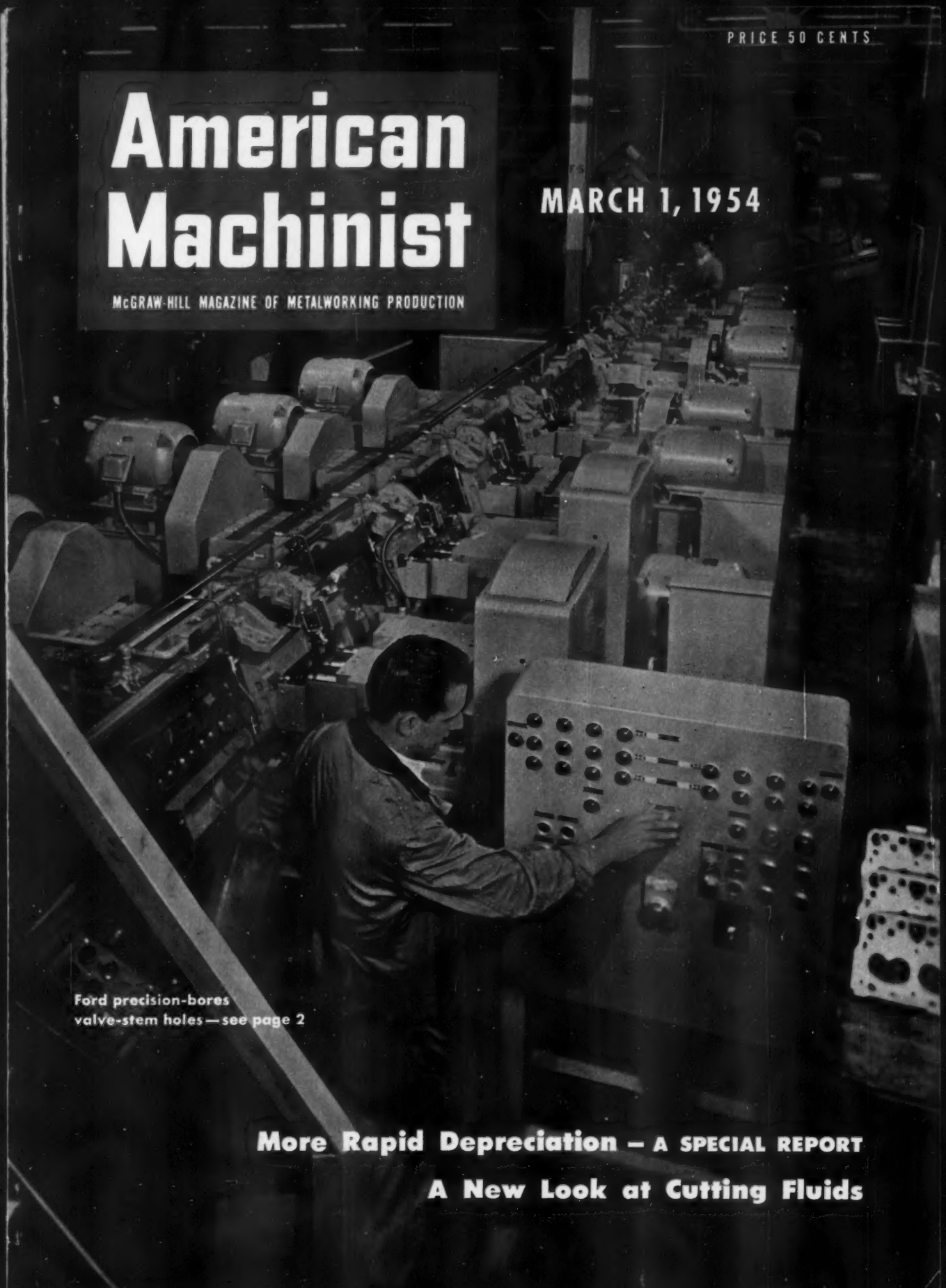
American Machinist

McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION

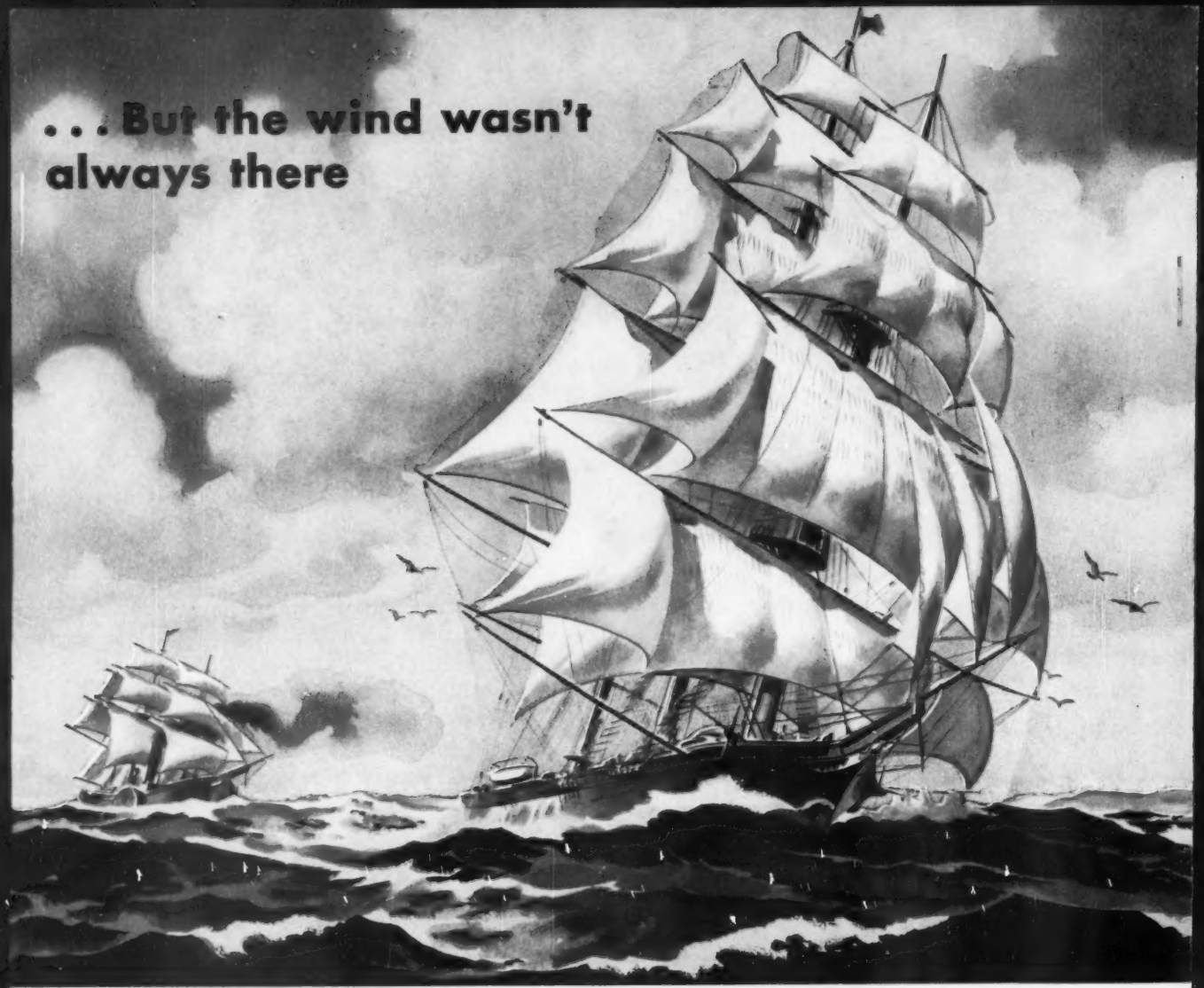
MARCH 1, 1954



Ford precision-bores valve-stem holes—see page 2

More Rapid Depreciation — A SPECIAL REPORT

A New Look at Cutting Fluids



IN THE Clipper ship era of the 1840's 20 knots with a favoring wind was considered good time — as indeed it would be today. But the wind wasn't always there. In the long run steam won out in the competitive race.

We say, "That's progress" but it's really competition which makes the difference between historic failures and continuing success. In the case of the Clippers something better, more dependable came along — and it will always be that way.

Like everyone else in today's highly competitive market you're certainly looking for new ways to improve product quality and cut manufacturing cost. Very possibly we here at Heald can help. Heald automatic sizing, constant feed throttling, centerless grinding, faster cycles, versatility, transfer type Bore-Matics, battery type equipment and a host of other unique Heald features for faster, better precision finishing are available for a wide variety of jobs. We would welcome the opportunity to show you how a fresh Heald viewpoint can help — on long or short runs, single or multi-purpose setups.

Competition is wonderful when you're *ahead* of it. Our business is to keep you there. That's why IT PAYS TO COME TO HEALD.

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CONTENTS FOR MARCH 1, 1954

VOL 98 NO. 5

ADMINISTRATION

95 EDITORIAL *Burnham Finney*
121 SUGGESTIONS OR EXTRACTIONS? *Round Table*

SPECIAL REPORT

113 IT'S TIME TO ADOPT REALISTIC DEPRECIATION RATES *Burnham Finney*

ENGINEERING

101 WHY SHOP COURSES IN COLLEGE? *Eugene W Dunlap*
102 "FLYING STOP" SHOWS DRILL CUTTING ACTION *Carl J Oxford, Jr*
106 PUT STANDARD MINUTES TO WORK *Kenneth L Kline*
127 OUTPUT SHAFT OF DIFFERENTIAL CONTROLS SPEED *Chris Stougaard*

MATERIAL CUTTING, FORMING

97 A NEW LOOK AT CUTTING FLUIDS *Harry N Leave*
105 ARE YOUR FEMALE THREADS STRIPPING?
110 DIESET "TAKE-APART" CART SAVES TIME, CUTS DIE DAMAGE *J G Schlindwein*
112 SAVE OIL, SAVE HEAT, SAVE MONEY
125 REBUILT 50-TON PRESS BURNISHES AXLE HOUSINGS *E Dalton White*
127 H-BEAM SUPPORTS YOKES FOR EASY DRILLING *A V Hogg*
131 METHODS OF GRINDING CYLINDRICAL PARTS
135 CHART FOR THREADING TIME *Tyler Hicks*

TOOLING

122 SHAPER ATTACHMENT GENERATES BEVEL GEARS *Haim Murro*
125 TITANIUM SCRIBER MARKS LINES ON GLASS *J M Heath*
125 SANDWICH HELPS DRILL SEMICIRCULAR HOLES *Francis Mernieks*
126 ROTATING TOOLHOLDER SHAPES DIE OPENINGS *Henry Gifford*
127 CENTER POSITIONING GAGE FOR ANGULAR WHEEL-TRUING *H J Gerber*
128 INTERCHANGEABLE TEMPLETS DIVERSIFY DRILL JIG *Laurence H Austin*
128 SLOT IN THREAD CLEANS BOLTS *C L Martin*
128 JACK REMOVES ARBORS FROM DRILL CHUCKS *Henry George*

NEWS OF METALWORKING

81 SPOT NEWS
83 WASHINGTON
85 DETROIT
87 MACHINE TOOLS
91 GAGING METALWORKING
138 NEWS OF METALWORKING

DEPARTMENTS

74 BACKLASH
125 PRACTICAL IDEAS
131 REFERENCE BOOK SHEETS
137 TALKING SHOP
144 NAMES IN THE NEWS
146 EQUIPMENT, MATERIALS, PARTS
163 ROUND TABLE DISCUSSION
200 NEW BOOKS

NUMBER OF COPIES PRINTED THIS ISSUE 36,409

chips

CYLINDER HEADS . . . A new Heald Model 335 Bore-Matic has been installed at the Ford-Cleveland Engine Plant. It is arranged for transfer-type operation, drilling, reaming, boring, and facing valve seats and stem holes on automotive cylinder heads. Our cover shows the operator at the control panel, and an inspector at the far end. The machine consists of 12 basically standard Heald way-leg units which carry the tools on the way-leg tables. Work is sequentially machined through the various stations to the far end, completely automatically.

REALISTIC . . . Our Special Report is on a very timely subject, realistic depreciation of plant equipment, and includes latest data on modification of our outdated depreciation laws. Prepared by Chief Editor Burnham Finney, it is a current handbook . . . Also for management's close perusal is the explanation of how to initiate a "standard-minute" incentive plan.

TOOLING . . . Three articles in this issue are devoted to new tooling ideas . . . J G Schlindwein, tool supervisor at Lyon Metal Products, explains a die cart that helps take dies apart and transport them to the toolroom . . . And there's the description of a shaper attachment for cutting bevel gears — each a 2-page article . . . Then we have a page on use of a Precipitron to remove oil fog from screw machines, and the savings therefrom.

NEW LOOK . . . Several times in recent years, we have published articles by advocates of simplicity in cutting fluids — men who suggest that four or five fluids will handle machining needs of most shops. In this issue, our lead article takes the opposite point of view. Harry N Leave of Van Straaten Chemical Co suggests chemical analysis as a basis for selection of cutting fluids to suit each job. He analyzes types available and suggests where each type fits best.

FLYING STOP . . . Exemplifying extensive research on drilling now under way, and announcing a new device for stopping a drill without disconnecting the chips, we have an abstract of a recent ASME paper by Carl Oxford, Jr. Ours is a picture-and-caption treatment, showing the stop, chip formation along cutting lips and web, and how to grind a crankshaft point on heavy-web drills to ease thrust in deep-hole drilling.

COMING . . . Mar 15 *AM* will have an unusual Special Report, giving latest data on electrical-discharge machining of hard materials like carbide. There are articles on plastic fixtures, on hard facing, barrel finishing, gaging bores, oil recovery from chips at Allis-Chalmers, air-tool feeding, and machining large crankshafts. There is also an explanation of cutting forces on a single-point tool, plus a cover showing the world's largest stretching press and an article describing its use in stretching sheet.

CARL J OXFORD, JR was born in Detroit, attended Wayne University and received his BSE (Engrg Mechanics) from U of Mich. After working as a machine designer for Cincinnati Milling Machine and National Automatic Tool, he joined the staff of the David Taylor Model Basin, BuShips, Carderock, Md, in 1941. In 1942 he was transferred to the Naval Aircraft Factory, Philadelphia, as Ordnance project engineer in charge of tow target and equipment research. In early 1945, he was moved to the Armament Branch, BuAer, in Washington.

In October, 1945, Mr Oxford joined the National Twist Drill & Tool Company as mechanical engineer and worked on design of special production machinery. He was appointed chief tool engineer in 1947 and was in charge of all product design until late 1952. Since 1952 he has been research engineer, doing basic research in metal-cutting and related fields. Results of some of this work appear in this issue.

ONE CUT
FROM THE SOLID
16 D. P. and Finer

- Gleason No. 2 Straight Bevel Generator
- Complete Precision Gears in one Operation
- Features Interlocking Multi-blade CONIFLEX® Cutters
- Easily Set-up for Job Lot Quantities
- Can Be Equipped with Automatic Loader
- Cuts CONIFLEX® Gears . . . Localized Tooth Bearing

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BUILDERS OF BEVEL GEAR MACHINERY FOR OVER 85 YEARS

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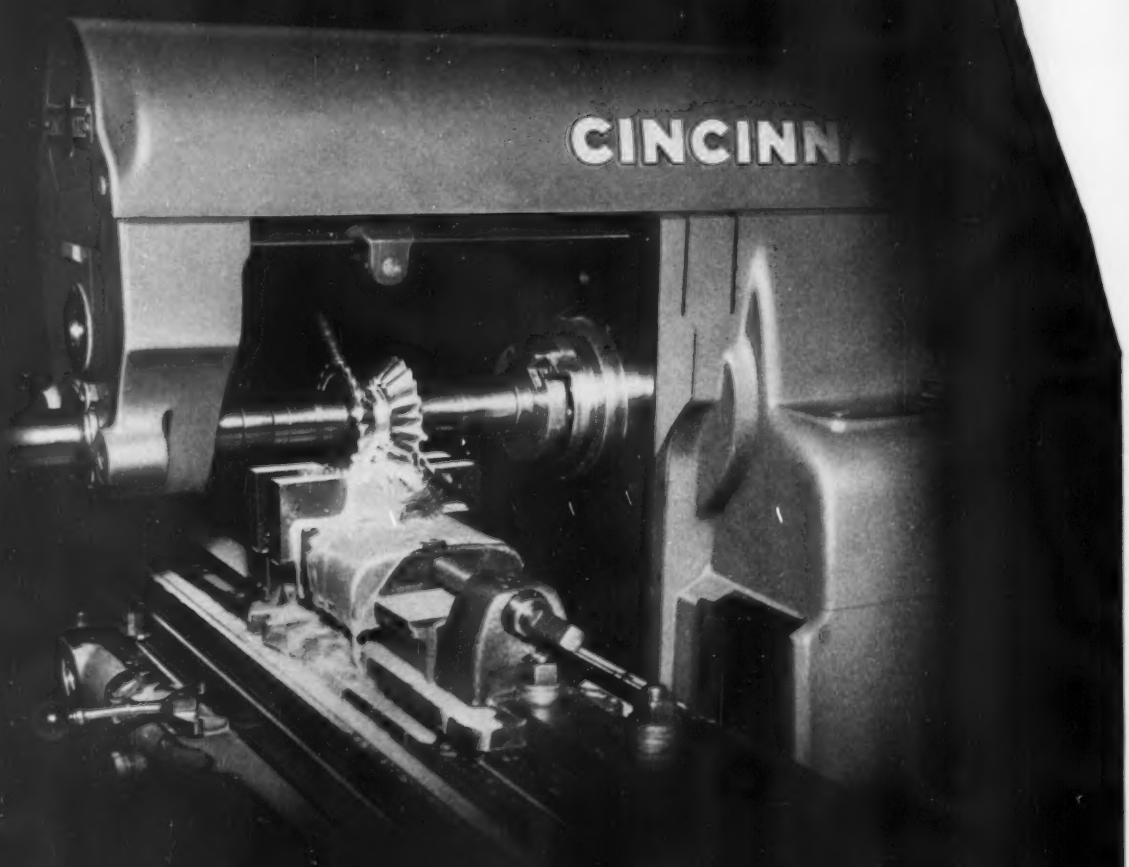
Surest Cure for Your High Toolroom



Cincinnati

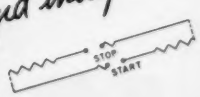
No. 2MI

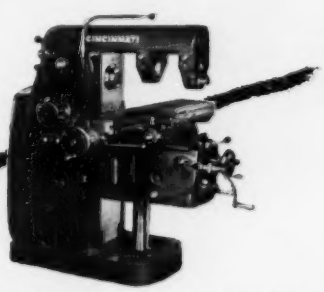
Horizontal Milling Machine
taking a heavy form milling cut

CINCIN

Milling Costs

Are you provoked at slow toolroom milling operations and inaccurate work? Fed up with maintenance bills? You can cure these and other ills of high cost toolroom milling by replacing your old equipment with new CINCINNATIS . . . in the No. 2 range, for example, with Nos. 2ML or 2MI. Reasons why these machines are good medicine for shops of all sizes are many.

Their Dynapoise overarm *smooths out the cutting action. Sixteen spindle speeds 25 to 1500 rpm are quickly selected with a single crank type control.* *Sixteen feeds within the entire range of 120 to 1 ratio are selected* *at the front of the knee with a similar control. Long life is promoted through automatic lubrication systems, such as the individual reservoir* *for the vertical screw. Reciprocal and climb milling operations can be handled on machines equipped with* *automatic backlash eliminator (extra). Control levers are directional and independent, for easier handling. Automatic table cycles*  *available for production setups (extra).*



Other advantages of CINCINNATI Nos. 2ML and 2MI Milling Machines may be of even greater value in your shop. May we tell you more about them? Brief specifications will be found in Sweet's Machine Tool File, and complete data may be obtained by writing for catalog No. M-1662-2.

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO

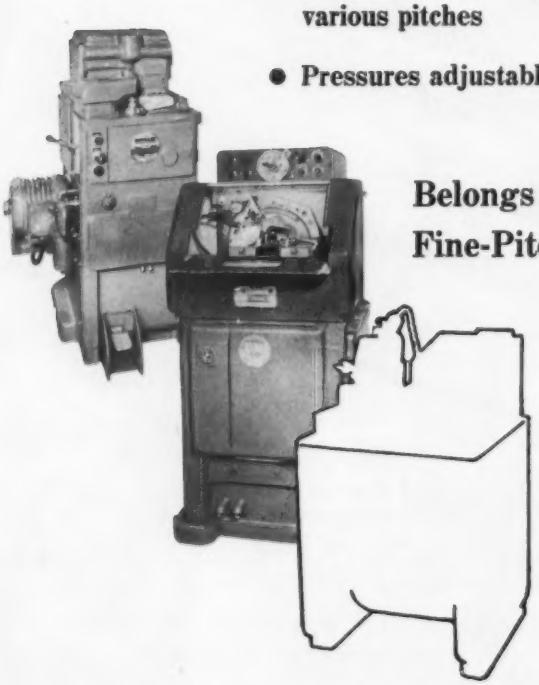
NATI

MILLING MACHINES • CUTTER SHARPENING MACHINES • BROACHING MACHINES • METAL FORMING MACHINES • FLAME HARDENING MACHINES • OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

Announcing a Fine-Pitch

for Chart-Recorded Inspection of

- **Records "composite errors" on chart . . . magnified 200x, 400x or 800x**
- **1/10,000-inch dial indicator for visual inspection**
- **Capacity to 4" p.d. . . . 20 pitch and finer . . . external or internal**
- **Multi-purpose turret fixture accommodates variety of small gears—saves tooling—simplifies loading**
- **Speeds variable to maintain maximum measuring speed for various pitches**
- **Pressures adjustable to conform to AGMA specifications**



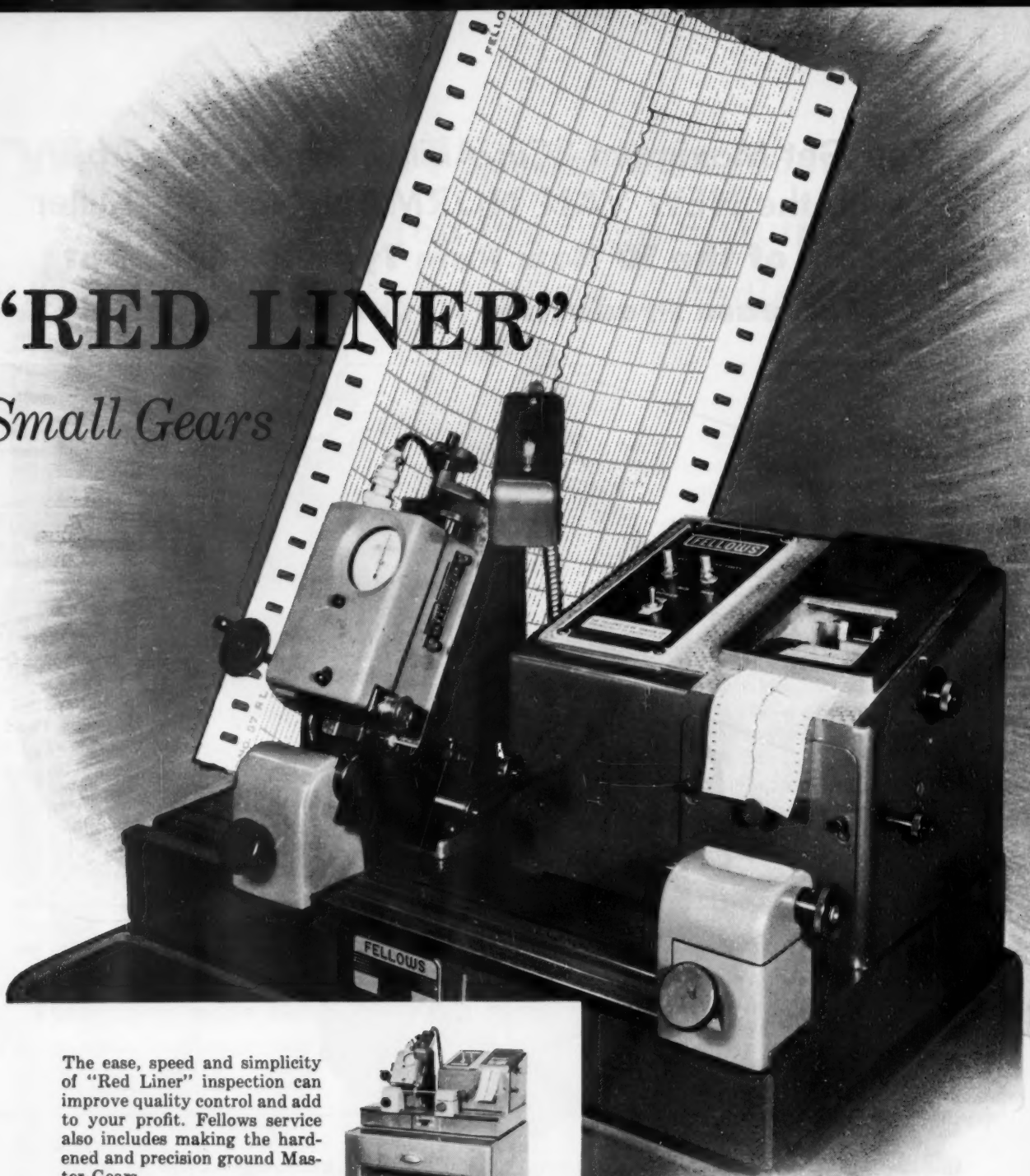
Belongs in Every Fine-Pitch Gear Cutting Layout

A third member of the Fellows Fine-Pitch team! A place should be waiting for it wherever the Fellows 3-Inch Fine-Pitch Gear Shaper and/or No. 4 Fine-Pitch Shaving Machine are in use.

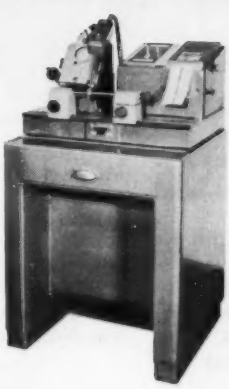
THE *Fellows*

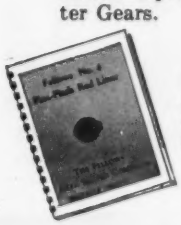
"RED LINER"

Small Gears



The ease, speed and simplicity of "Red Liner" inspection can improve quality control and add to your profit. Fellows service also includes making the hardened and precision ground Master Gears.





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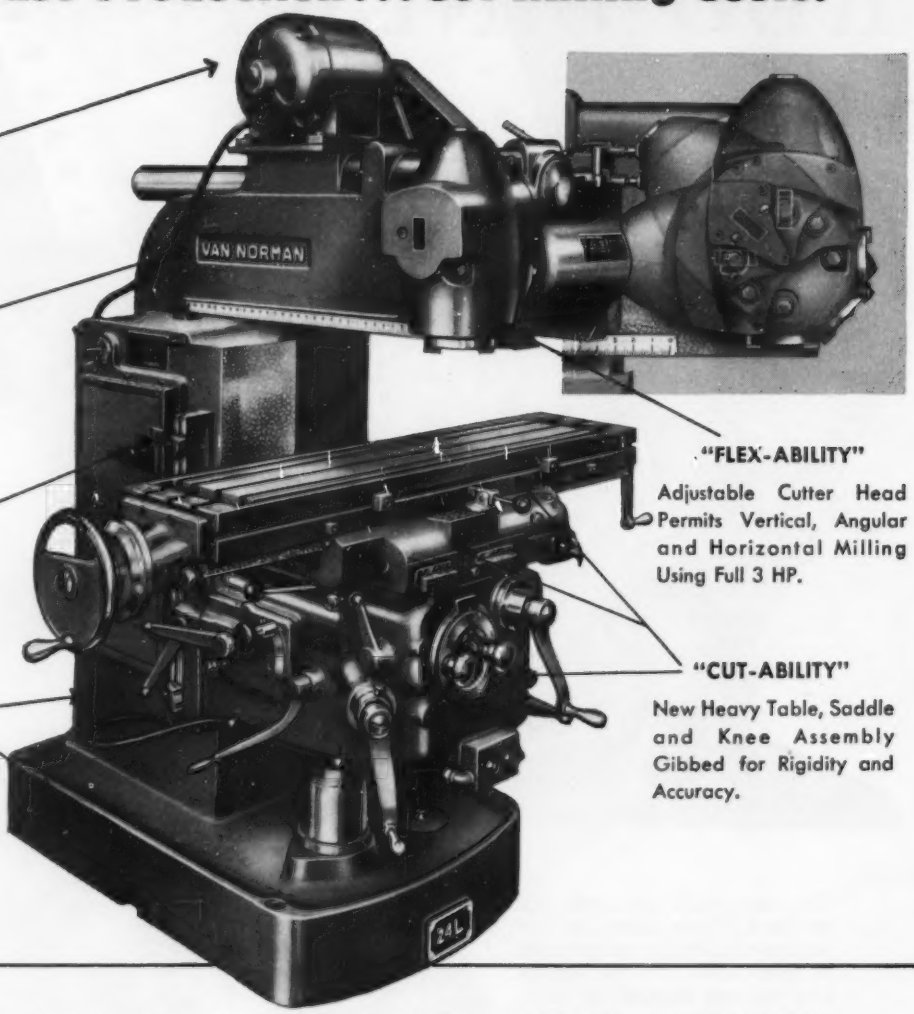
You Get Maximum "*Cut-Ability*" and "*Flex-Ability*" with the NEW VAN NORMAN No. 24L Miller

One of the 10 New Ram Type Models that Increase Production . . . Cut Milling Costs!



"CUT-ABILITY"
3HP Motor Drives Cutter Head Only.

"FLEX-ABILITY"
New Extended Ram with Large Ways, Permits Increased Range — Ram Travel 29".

"FLEX-ABILITY"
New Motor Controls with Single Lever Selector Switch.

"CUT-ABILITY"
New Larger Box Type Column Provides Maximum Rigidity. New Heavy Base Has Larger Coolant Reservoir.

"FLEX-ABILITY"
Adjustable Cutter Head Permits Vertical, Angular and Horizontal Milling Using Full 3 HP.

"CUT-ABILITY"
New Heavy Table, Saddle and Knee Assembly Gibbed for Rigidity and Accuracy.

Extra Features that Add to the "Cut-Ability" and "Flex-Ability" of the No. 24L Miller

New heavy motorized knee with direct drive feed motor mounted on knee.

"Start-Stop" buttons operate on 110 volts provided at front and rear with single lever selector switch to control use of motors.

Front and rear controls are directional . . . operate in the direction of desired table, saddle or knee movement. Exclusive Van Norman speed and feed selectors.

Write for more information about the new Van Norman Ram Type Millers.

VAN NORMAN Manufacturers of — Ram and Column Type Milling Machines, Cylindrical Grinders, Spline and Gear Grinders, Oscillating Radius Grinders, Special Production Grinders, Centerless Grinders.

VAN NORMAN *Special* Mass Production

Grinders Give Top Production Output

. . . Lowest "Cost-Per-Piece" Grinding

Van Norman Production Grinder designed for Plunge-Cut Grinding.

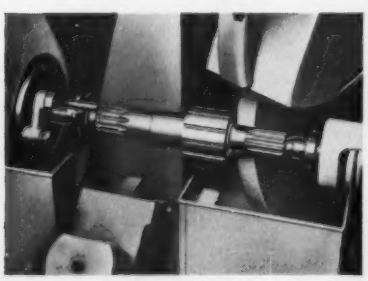
You just can't beat Van Norman Special Cylindrical Grinders for fast, economical mass production.

Van Norman designs and builds these grinders to meet your exacting requirements. Its experience in manufacturing production grinding machines since 1912 assures the utmost in performance.

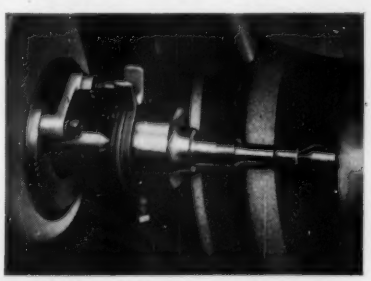
Illustrated is a typical Van Norman special production grinder designed for a major industry. Day after day this and similar production grinders are showing substantial savings by keeping production up and costs down.

If you have a mass production grinding problem, let Van Norman help you solve it. Write Van Norman Company, Springfield 7, Massachusetts.

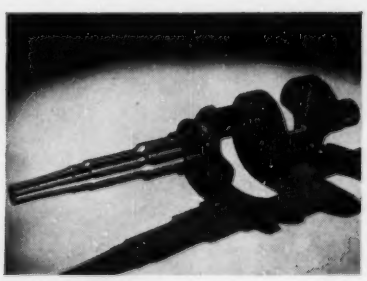
EXAMPLES OF WORK BEING MASS PRODUCED ON SPECIAL VAN NORMAN GRINDERS



Grinding a diameter and a face on a transmission shaft.



Plunge-Cut Grinding a spindle with two spaced wheels.

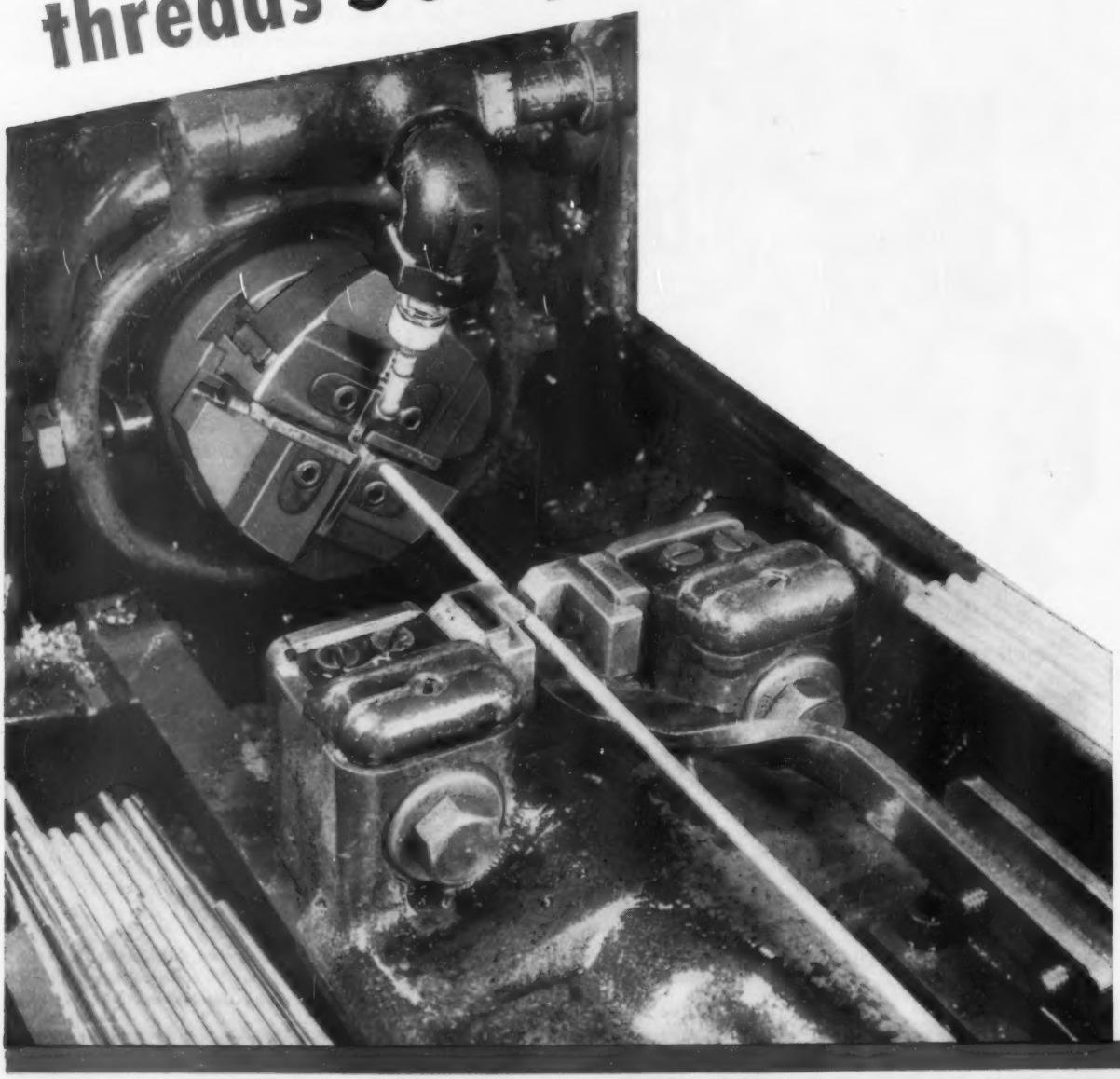


Multiple diameters, shoulders and tapers on this crankshaft are ground on double head special Van Norman Grinder.

VAN NORMAN CO., Springfield 7, Mass.

3/8" Machine

threads 500 pieces per hour



THE WORLD'S LARGEST MANUFACTURERS OF THREADING EQUIPMENT

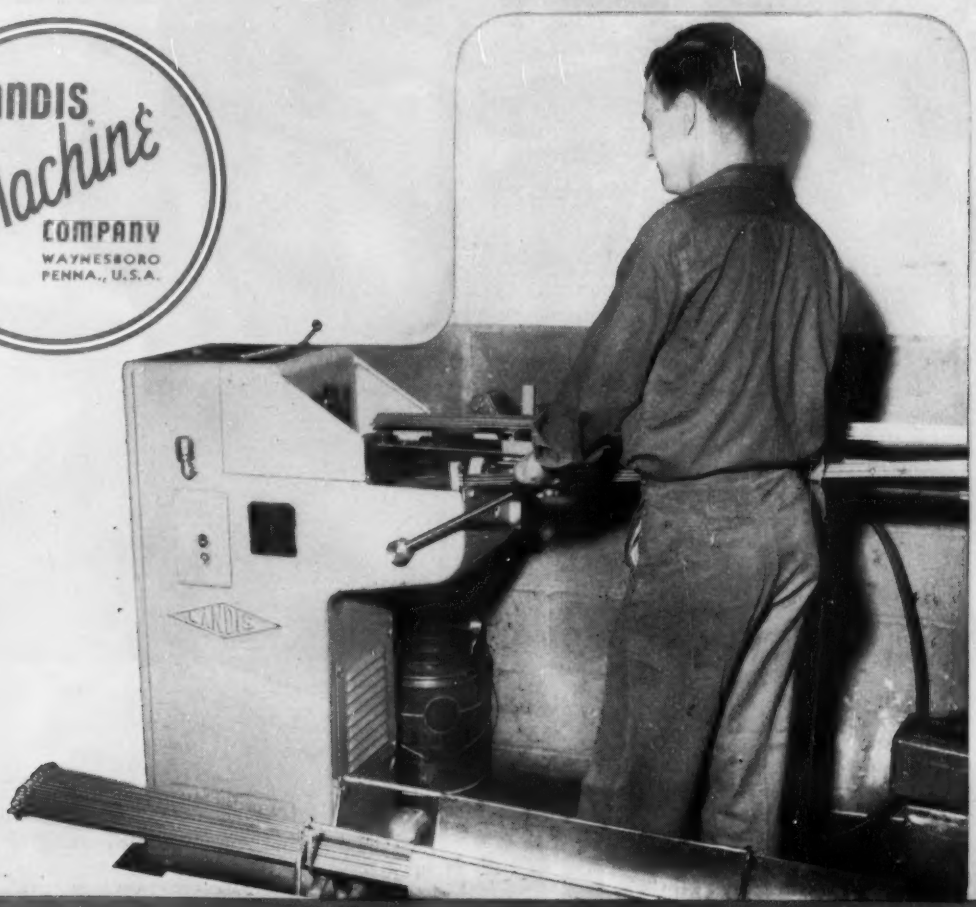
One method of achieving production savings on small diameter threading operations is illustrated at Mid-West Wire Products, wire products fabricators in Detroit, Michigan. The installation of LANDIS ⅜" Threading Machines has increased the output of threaded galvanized wire for automobile seat lock rods 25% over previous methods.

#10 24-piece UN threads are cut 1¾" long on 54" galvanized wire rods. Production now averages about 500 pieces per hour, with 4,500 pieces threaded between grinds of the chasers. Thus, with excellent production between chaser grinds, low tool cost and minimum down time are assured through the use of long life LANDIS Tangential Chasers which can be reground for 80% of their original length. Best previous threading methods never produced more than 400 pieces per hour, and completed only 2,500 pieces before requiring the chasers to be reground.

The ⅜" Machine is a small high-speed machine for threading small parts (3/16" to ½" in diameter) to precision tolerances. This machine has been designed so that it can be operated with only one hand, freeing the other hand for loading and unloading the workpiece. The opening and closing of the grips is automatically controlled by the carriage operating lever, and the die head automatically opens on completion of the thread and closes during the carriage return.

Analyze the threading operations in your plant today for the possibility of a similar production saving. Then send us the specifications of the workpiece involved, and ask for Bulletin H-91 for more detailed information about the LANDIS ⅜" high Speed Threading Machine.

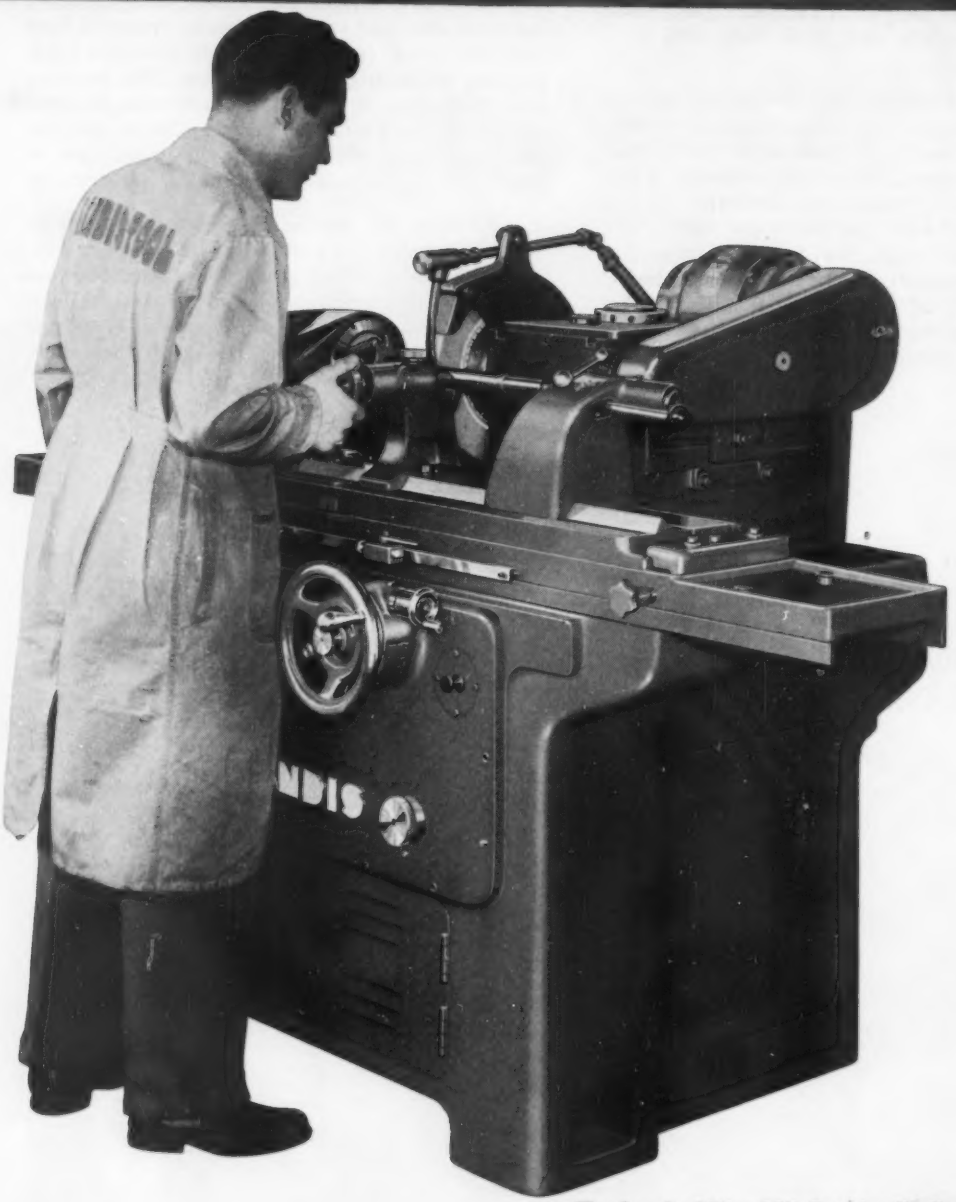
LANDIS Machine COMPANY
WAYNESBORO PENNA., U.S.A.



CUTTING - TAPPING - GRINDING - ROLLING

Save Time on Your Grinding Setups

One machine for all these jobs...



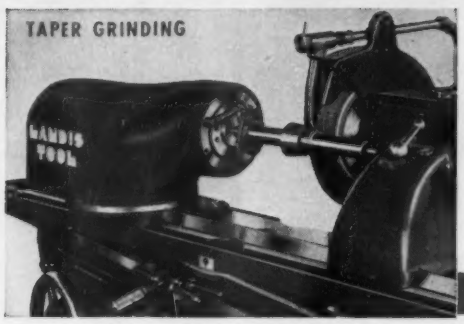
LANDIS

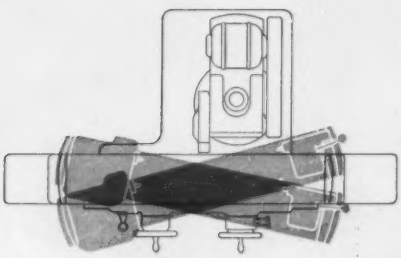
precision grinders

The Landis 12" x 28" Grindwell offers many operating features of larger Universal Grinders with savings in cost and floor space. Engineering Features: infinitely variable headstock speeds . . . live or dead spindle . . . two speed hand traverse and four speed power traverse . . . precision coarse and fine wheel feed . . . Microsphere wheel spindle bearings for high precision and fast spark-outs . . . swiveling headstock, wheelbase and work table.

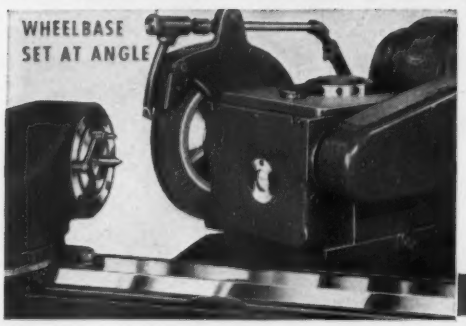
LANDIS Grindwell

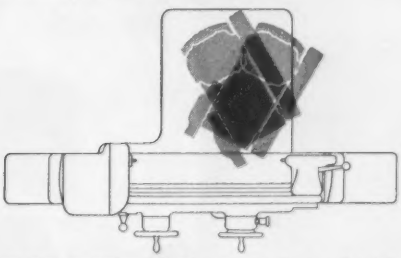
a low cost Universal Grinder designed for speedy setups and precision tolerances



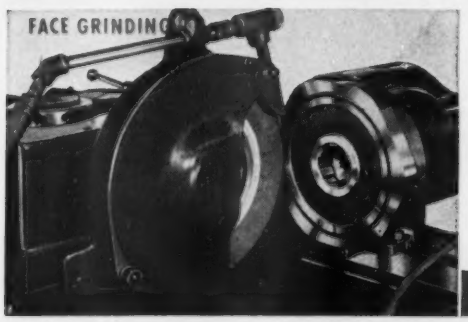


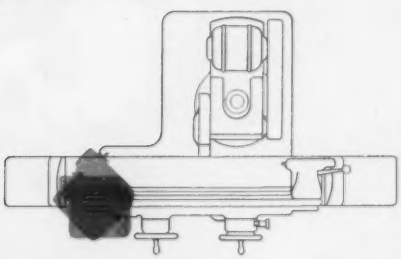
WORK TABLE SWIVEL—Calibrated scale at end of table for setting angle of taper grinding up to 24° included angle or 5" per foot. Center scale graduated for turning table 90° either direction.



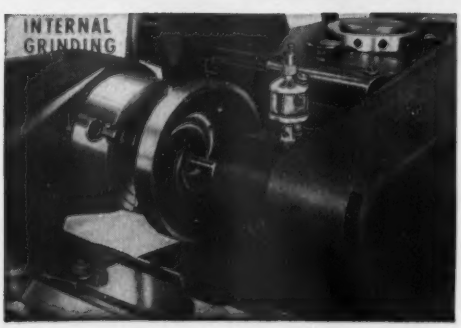


GRINDING WHEEL SWIVEL—Calibrated scale so wheel head can be set for angle up to 90° in either direction to eliminate work piece interference or dress angle on face of wheel.





HEADSTOCK SWIVEL--Calibrated scale so angle up to 90° in either direction can be set for face grinding and tapered external or internal grinding of chucked work pieces.



For detailed features and specifications, write for Bulletin S-49.

LANDIS TOOL COMPANY

WAYNESBORO, PENNA., U. S. A.

Bullseye!...

on the mark within .0002"

Here's precision, speed and versatility to perform boring, drilling and milling operations with equally high efficiency. Here's capacity to handle large or small work, simple or complex set-ups, long or short runs. Here's the 350-T, another superlative G&L Horizontal Boring, Drilling and Milling Machine

As one enthusiastic production engineer put it, "We've found our G&L horizontal bar furnishes faster cutting speeds, heavier cuts, better finishes, greater efficiency and improved operating economy. Its 45 speeds and 36 feeds are so well designed that the machine provides excellent performance for an overall range of milling, drilling and boring practices."

Here briefly are some of the features of this 25 hp, 5" spindle, table-type machine — choice of three basic arrangements of table and saddle; hardened, heavy-duty ways on bed and saddle; rapid, easy speed selection; bed lengths from 96" to 144"; column heights from 48" to 72"; and cross travel ranging from 72" to 120" with saddle supports.

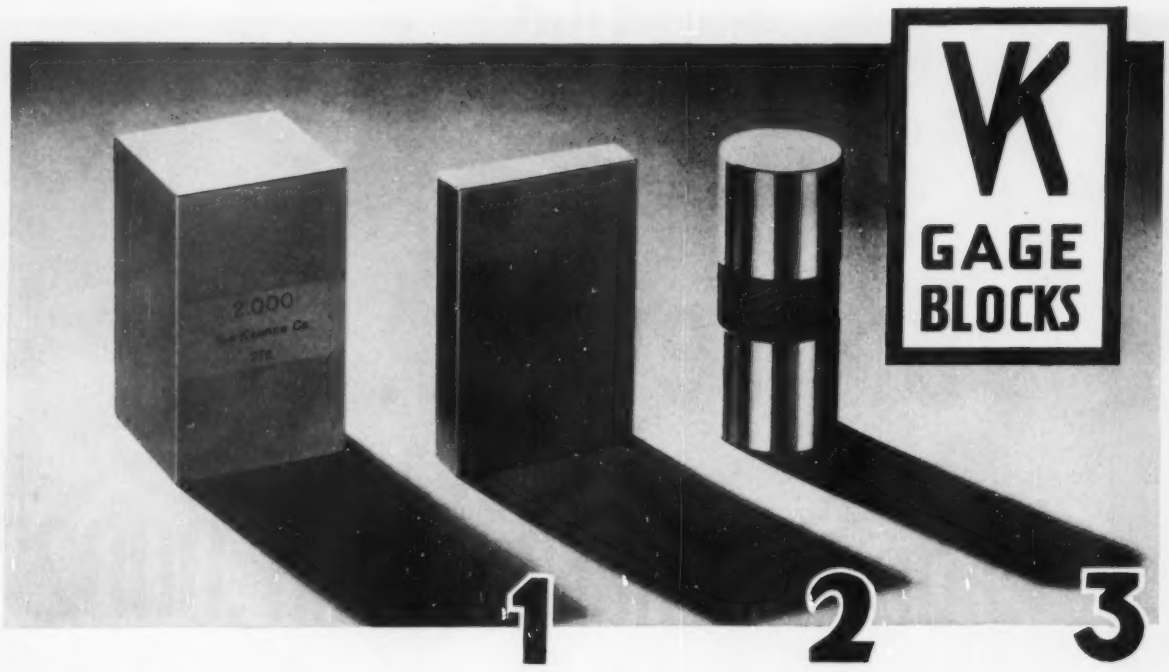
What's more, these versatile machines can be equipped with the G&L Automatic Electric Positioning Device. This unit eliminates many time-consuming hours for final hand adjustments for locating work. That's because it automatically controls table and headstock movements to precise, pre-determined settings.

For complete information, see your G&L representative or write ———

GIDDINGS & LEWIS MACHINE TOOL CO.
FOND DU LAC, WISCONSIN

Builders of the world's finest heavy-duty Horizontal Boring, Drilling and Milling Machines — table, floor and planer types; Hypro Double Housing and Open Side Planers, Planer Type Milling Machines and Vertical Boring Mills; and Davis Cutting Tools.

Photo courtesy of Greenlee Bros. & Co.



THREE WAYS *to protect production accuracy*

To meet closest limits of accuracy and protect production, Van Keuren is currently furnishing three types of gage blocks:

1—SOLID SQUARE MASTER BLOCKS
2—RECTANGULAR REFERENCE GAGES
3—MICROGAGES

Shipment on complete sets of any of these three types can be made within 60 days from receipt of order.

VK Solid Square Master Blocks are accurate to .000004" per inch of length and are designed for laboratory use or to standardize all shop dimensions. Large wearing surface; perfect parallelism. Available in 85- and 41-block sets and guaranteed unconditionally for 5 years not to exceed .0001" in wear.

VK Rectangular Reference Gages are guaranteed accurate to .000008" per inch of length and are designed for the inspection department or precision set up work. They are available in 81-block and 33-block sets. Individual blocks from either of these sets can also be furnished. Certificate of size is also furnished with each set.

VK Microgages are accurate to plus .000012", minus .000008" per inch of length and are designed as working gages for shop use . . . to put accuracy at the machine. Wearing surface is 40% greater than that of rectangular gage blocks hence their long-wearing quality. Available in several set combinations.

Van Keuren Gage Blocks are fully described in Catalog and Handbook No. 35, yours for the asking by writing: The Van Keuren Co., 173 Waltham St., Watertown, Mass.

VK

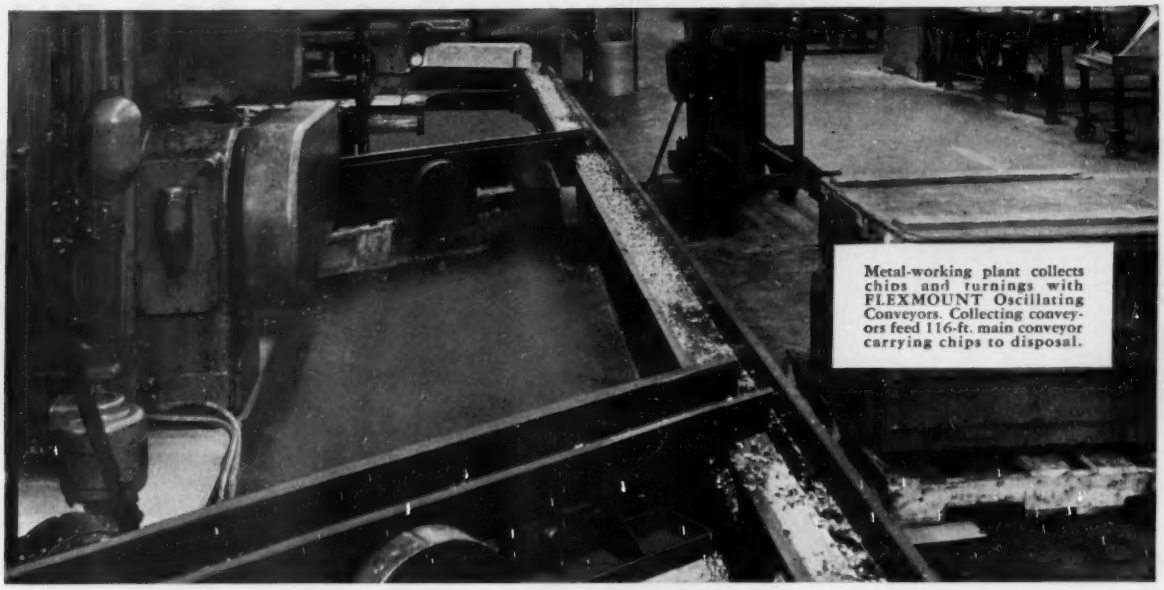
35th YEAR

THE *Van Keuren* CO.,

173 WALTHAM STREET, WATERTOWN, MASS.

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Cemented Carbide Plug Gages • Carboloy Cemented Carbide Measuring Wires • Chrome Carbide Taper Insert Plug Gages

Low in cost! Highly effective!



Metal-working plant collects chips and turnings with FLEXMOUNT Oscillating Conveyors. Collecting conveyors feed 116-ft. main conveyor carrying chips to disposal.

FLEXMOUNT CONVEYORS can be installed from stock

Standardize on this versatile oscillating conveyor for your chip collection system

MASS-PRODUCED in standard lengths and standard widths, FLEXMOUNT Oscillating Conveyors cost far less than specially engineered units. They can be built up to any required length . . . from sections *carried in stock.*

FLEXMOUNTS are as easy to install as they are to order. Requiring an opening only slightly larger than the trough, they're a natural for restricted space. And the all-metal, leakproof trough has proved the low-cost answer for chips, turnings, blasting shot, punchings or stampings.

Get the complete information on FLEXMOUNT Oscillating Conveyors from your nearby Link-Belt office or distributor. He can give you a "desk-top" demonstration of FLEXMOUNT efficiency. And be sure to ask for your informative copy of Book 2478.

How Positive Action moves material

Positive-action, constant-stroke eccentric provides a powerful, yet gentle upward and forward oscillating motion. Large volumes of material are moved in a uniform, continuous flow, regardless of surges. Resonant spring action of resilient legs cuts power requirements to a minimum.

LINK-BELT

FLEXMOUNT OSCILLATING CONVEYORS

13,445

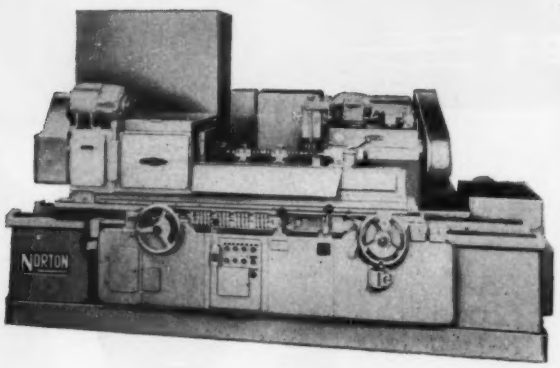
LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

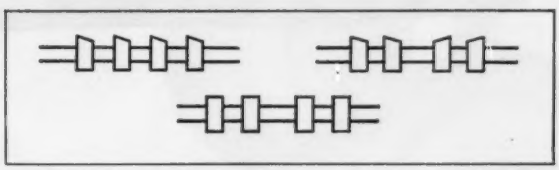
HERE'S HOW YOU CAN ADD THE

Thanks to the many automatic features of the No. 2 CAM-O-MATIC Grinder, this operator's work is reduced to loading and unloading. He can now tend two or more machines — another big advantage of this Norton-engineered "Touch of Gold."

"TOUCH OF GOLD"

TO YOUR CAMSHAFT GRINDING





The Norton No. 2 CAM-O-MATIC Grinder brings you time-and-money-saving advantages found in no other grinding machine.

In the Norton No. 2 CAM-O-MATIC Grinder you get an ahead-of-the-parade grinding machine that has expert operating skill built right into it. That's your Norton-developed "Touch of Gold" that turns out better camshafts in less time and with less labor . . . adding to product-value and cutting your costs every step of the way.

Speed Is ALWAYS Right — Automatically

One big advantage is the automatically compensating work speed arrangement. Starting with the ideal speed for rapid stock removal, this changes gradually to exactly the right speed for fine finishing and contour accuracy — as each cam is being ground. Eliminating guesswork and manual adjustment, this exclusive Norton improvement steps up both the quality and rate of your production.

Your Choice of Tapers

The swiveling wheel slide — a Norton patent — permits grinding cam tapers in one direction (standard equipment) or tapers in opposite directions on the same shaft (an optional extra). Both arrangements permit straight-face grinding by a simple adjustment. Both grind tapers fast and accurately, while increasing the versatility and capacity of your camshaft operations.

No Lost Motion

The entire operating cycle is geared to split-second efficiency. Indexing is ultra-smooth and extra rapid. Wheel slide retraction after grinding each cam is no greater than maximum stock removal. And the fluid, shockless operation is a sure indication of longer, more profitable service life.

Get All the Facts

on the No. 2 CAM-O-MATIC Grinder from your Norton Representative. Ask him, or write direct, for the 20-page illustrated booklet, No. 195. And remember: only Norton offers you such long experience in both grinding wheels and machines — your assurance of the value-adding, profit-boosting "Touch of Gold." NORTON COMPANY, Worcester 6, Massachusetts.

To Economize, Modernize With **NEW**

NORTON

GRINDERS *and* LAPPERS

Making better products . . . to make other products better

District Sales Offices: Hartford • New York • Cleveland • Chicago • Detroit
In Canada: J. H. Ryder Machinery Co., Ltd., Toronto 5, Ontario

This little red wagon presented a big drawing problem!

A Standard engineer's advice helped cut rejects by over 90%

● In the manufacture of children's wagons at the Steger Products Manufacturing Company in Steger, Illinois, 20-gauge cold rolled steel is drawn to a 4½" depth. Of the 8-hour shift capacity of 1600 to 1800 wagon bodies, up to 20% formerly wound up as rejects. Also, it was necessary to clean the dies after every 10 to 15 bodies. A single small scratch on the die caused excessive die galling and torn or ruined bodies.

The company tried 10 or more drawing compounds without solving the problem. Then a Standard Cutting Oil Engineer suggested STANICOOL HD Soluble Oil.

That was six years ago and STANICOOL HD is still on the job. The reject rate has been reduced to less than 1% a day. Die galling has come down to almost nothing. Dies are now cleaned only once or twice daily. Again, Standard Oil's metalworking products prove they can do the hard jobs better!

STANICOOL HD Soluble Oil: for cutting and grinding operations, for certain forming operations. Mixes readily, non-irritating, anti-rust. To take full advantage of this many-purpose cutting fluid, call on the services of your Standard Oil Cutting Oil Engineer. If your plant is located in the Midwest, write Standard Oil Company (Indiana), 910 S. Michigan Avenue, Chicago 80, Illinois, to secure the services of the Standard Cutting Oil Engineer nearest you.

Standard's Bill Easterwood worked with the Steger Company on their drawing problem. Specially trained, Bill Easterwood is one of a corps of cutting oil and lubrication engineers headquartered near your plant throughout the Midwest. There's a specialist to assist you with *your* lubrication problem.

At Steger, die cleaning is of major importance because a single scratch can result in torn or ruined bodies during the processing. Since the introduction of STANICOOL HD, the time-consuming die-cleaning operation has been safely reduced to an *effective* minimum.

In this deep-draw operation STANICOOL HD is used just as it comes from the barrel without the addition of water. The 22-gauge cold rolled steel is drawn to a depth of 4½". The sheets are dabbed with STANICOOL HD as they are put on the press. Breakage which formerly had been a major problem has been reduced to a point where it is no problem at all.

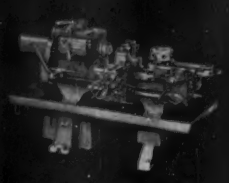
STANDARD

STANDARD OIL COMPANY *(Indiana)*

A complete line of metalworking products including: STANICUT Cutting Oils—Special duty cutting oils with correct proportions of extreme-pressure and friction-reducing ingredients. STANOSTAMP Compounds—Three established products for stamping or heavy drawing operations on either low-carbon or alloy steels. SUPERLA Quenching Oil—For quenching work on systems where cooling facilities are limited and bath temperatures are high; efficient quenchings of large forgings.

TURRET LATHES | **RAM TYPE ▸ ▾ SADDLE TYPE**

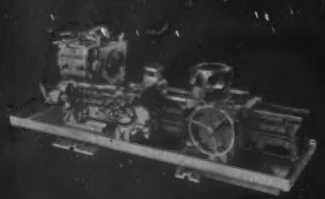
NO. 2 ALL-GEARED HEAD
1" Bar Capacity — 14" Swing



NO. 3 UNIVERSAL
1½" Bar Capacity — 15⅛" Swing

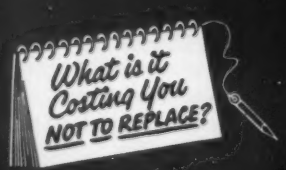
1-A UNIVERSAL HEAVY DUTY
2½" or 3" Bar Capacity — 16¼" Swing

2-A UNIVERSAL HEAVY DUTY
3½" Bar Capacity — 20" Swing



3-A UNIVERSAL HEAVY DUTY
4½" or 6" Bar Capacity — 23½" Swing

4-A UNIVERSAL HEAVY DUTY
8", 9" or 12" Bar Capacity — 28¼" Swing



Get the competitive edge for the years ahead...

by planning a continuing modernization program

Look to the company that is constantly analyzing modern trends in metalworking to better fulfill the needs of industry by developing new types and sizes of machines — extending its Sales Engineering facilities to be of even greater service.

Look to your Warner & Swasey Field Engineer as your "turning specialist". He can help you select the right machine, and will continue to *share your interest* in its performance in the years ahead.

ELECTRO-CYCLES

NO. 1 ELECTRO-CYCLE
⅝" Bar Capacity — 13" Swing

NO. 2 ELECTRO-CYCLE
1" Bar Capacity — 14" Swing

YOU CAN TURN IT BETTER, FASTER, FOR LESS WITH WARNER

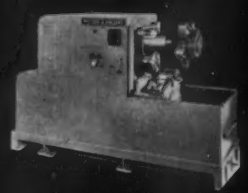
PRECISION TAPPING AND THREADING MACHINES

NO. 4 UNIVERSAL
2" Bar Capacity—18⅛" Swing

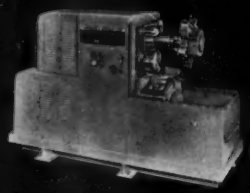
NO. 5 UNIVERSAL
2½" Bar Capacity—20" Swing

SINGLE SPINDLE AUTOMATICS

NO. 10 TAPPING MACHINE
0-80 to 10-24 Capacity



1 AC CHUCKING MACHINE
8" or 10" Chuck—6" Working Stroke

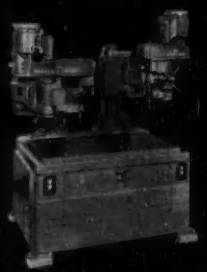


2 AC CHUCKING MACHINE
10" or 12" Chuck—9" Working Stroke

NO. 1T TAPPING MACHINE
8-36 to ⅞" Capacity

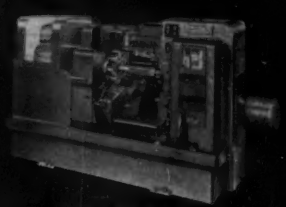
MULTI-SPINDLE AUTOMATICS

6-SPINDLE BAR MACHINE
¾" or 1¼" Bar Capacity



NO. 11 RS RADIAL (Single Head)
NO. 11 RD RADIAL (Double Head)
8-36 to ⅞" Capacity

5-SPINDLE BAR MACHINE
1¾" Standard Bar Capacity
2¼" Oversize Capacity



5-SPINDLE CHUCKING MACHINE
6" Swing

NO. 12 TAPPING MACHINE
⅜" to 2½" Capacity

NO. 3 ELECTRO-CYCLE
1½" Bar Capacity—15⅜" Swing

16" ELECTRO-CYCLE
1½" Bar Capacity—16⅞" Swing

WARNER & SWASEY
Cleveland
PRECISION MACHINERY SINCE 1880

& SWASEY TURRET LATHES, AUTOMATICS, TAPPING MACHINES

New!

VARY-TALLY

Multiple-Unit Reset Counter

DESIGNED TO COUNT ANYTHING COUNTABLE

this new Vary-Tally can be supplied in any combination up to 6 banks high, 12 units wide, with the counting units arranged compactly on stands in tiers. Now check these special features of Veeder-Root design and construction:

- Easily Readable from any Angle . . . Bold Figures Always Centered in Window . . . No Glare . . . Figures not Covered by Fingers in Operation
- Easily Portable, yet Ruggedly Built for Long Wear
- Separate Counting Units Can be Rotated like Tires on a Car, to Distribute Wear Evenly
- All Parts Corrosion-Resistant
- Working Parts of Hardened Steel
- Operation Not Affected by Extreme Heat or Cold
- Individual Tag Above Each Counter-Window — Not Strip Tabs
- Veeder-Root Quality in Every Part

Now what's on *your* mind, that Vary-Tally can help you count? Write for news sheet and prices.

"The Name that Counts"

VEEDER-ROOT INC.

HARTFORD 2, CONNECTICUT

Chicago 6, Ill. • New York 19, N. Y. • Greenville, S. C. • Montreal 2, Canada • Dundee, Scotland • Offices and Agents in Principal Cities

plus 3 minus 7

A Profitable Investment for *any* plant!

The world-renowned Otis Elevator Company recently installed three "AMERICAN" Duplicator Lathes which replaced seven engine lathes.

Such savings are the rule—not the exception—when "AMERICAN" Duplicators are put on the job.

These machines are performing "miracles" in savings in many of the largest and best known units of the metal working industry. They have introduced a new machining technique that has revolutionized the art of turning metal.

They reproduce work shapes from a template faithfully and accurately. They reproduce steps, tapers, right angle and tapered shoulders, recesses, grinding necks and radii, and are especially productive on such work as spindles, motor shafts, valve stems, back shafts, piston rods, axles and a wide variety of chucking work having irregular contours.

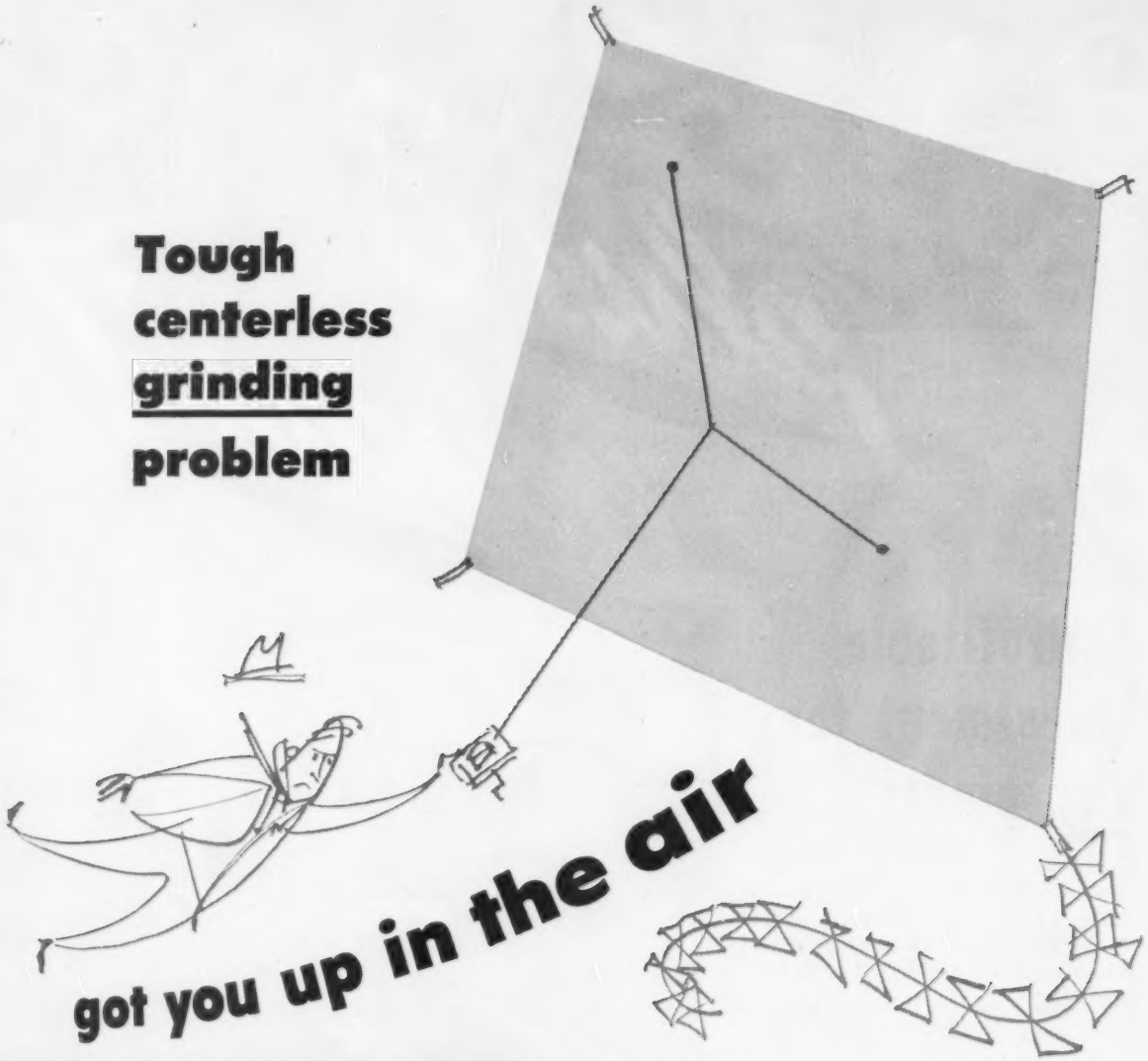
More and more the necessity of reducing manufacturing costs is crystallizing in the minds of management. The attention of directors, top officials and especially production executives is being focused to an increasingly greater degree upon cost-cutting equipment. It is inevitable, therefore, that the "AMERICAN" Hydraulic Duplicating Lathe should command the spotlight. Evidence from a hundred installations proves beyond a shadow of a doubt their leadership as top flight cost reducers.

If it's proof you want just drop us a line—no obligation.

THE AMERICAN TOOL WORKS CO. **Cincinnati, Ohio U.S.A.**

Lathes and Radial Drills

Tough centerless grinding problem



got you up in the air

CINCINNATI GRINDING WHEELS and Segments are available in vitrified and resinoid bonds with aluminum oxide or silicon carbide grits.

Here's the grinding wheel that will ABSOLUTELY solve it!

Why let a tough centerless grinding problem *keep* you up in the air? CINCINNATI Grinding Wheels can help you get your feet on solid ground again . . . because CINCINNATI Wheels are *made to team-up with centerless grinders.*

What's more, with a Cincinnati Milling-trained machinist on the spot to help you get the most out of CINCINNATI Grinding Wheels, you can count on the right answer—FAST!

Here's why CINCINNATI Wheels can help you solve that tough centerless grinding problem:

1 CINCINNATI Grinding Wheels are used by—and *developed by*—Cincinnati Milling, which

has done more research, had more experience and made more centerless grinders than any other organization in the world.

2 Using CINCINNATI Wheels, we've solved hundreds of centerless grinding problems—such as production, roundness, taper, sizing, stock removal and finish.

3 CINCINNATI Grinding Wheels represent 25 years of Cincinnati Milling research and practical experience based on an entirely new approach to grinding wheels—the development of the grinding wheel as a true cutting tool.

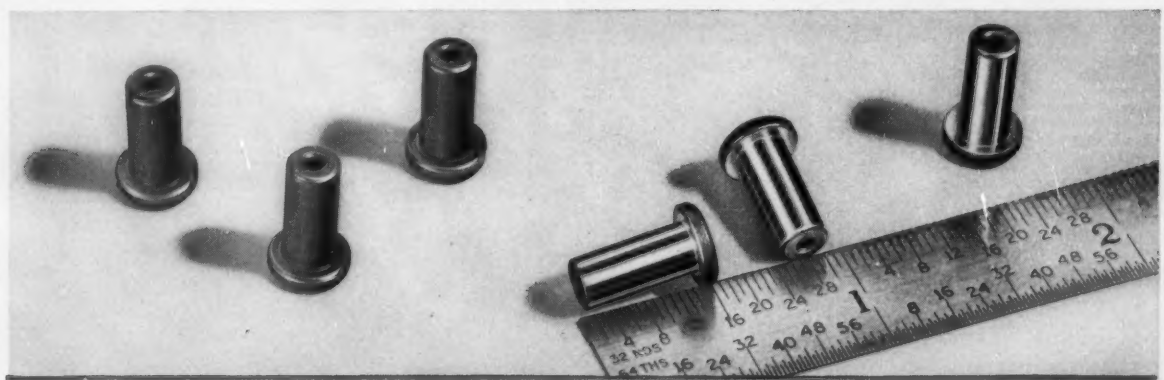
We are so confident—*so absolutely sure*—that CINCINNATI Grinding Wheels can help solve your tough centerless grinding problem that we make this *unconditional offer:* either you must be completely satisfied, or we will make no charge for the CINCINNATI Grinding Wheel used.

So contact us at once. We'll send one of our expert machinists—men who are Cincinnati Milling-trained and know grinding and grinding machines as well as grinding wheels. He can show you how to get the most out of CINCINNATI Grinding Wheels and help you solve that tough centerless grinding problem. There is no charge for his service. Write, wire or phone Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Company, Cincinnati 9, Ohio.

CASE HISTORY No. 501

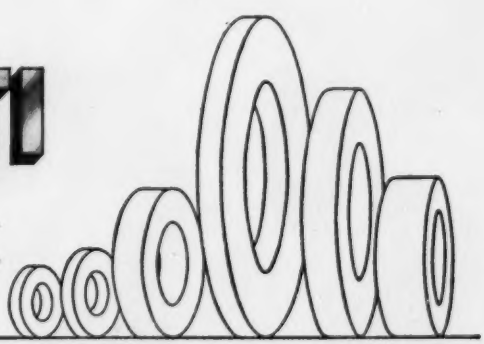
How CINCINNATI GRINDING WHEELS Solved Tough Centerless Grinding Problem

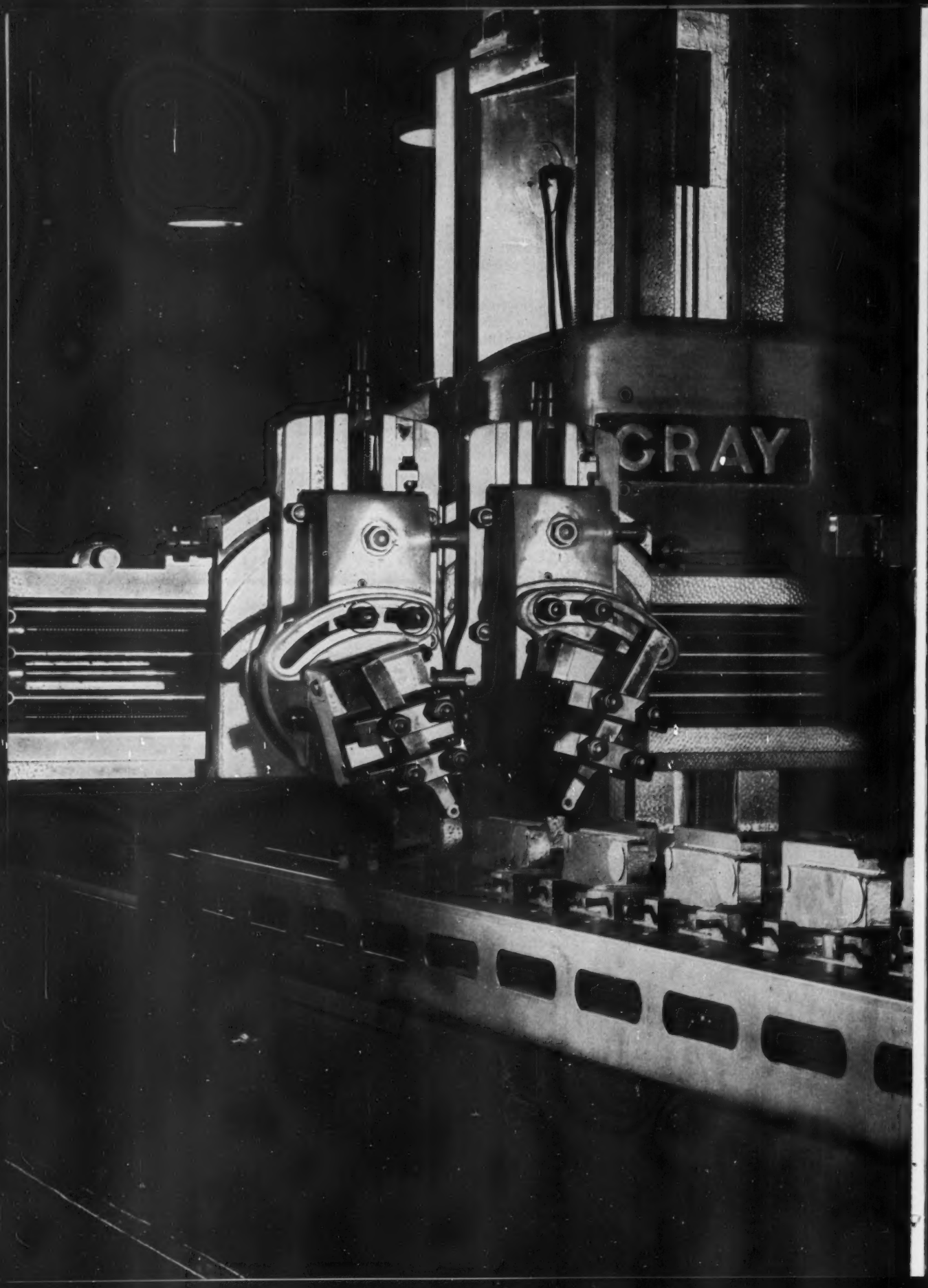
The job	Centerless grind aircraft rivets. Material - 6320 steel. Stock removal — .006" - .008" on body and .002" - .005" under head.
The machine	Cincinnati #2 Centerless.
The problem	Customer wanted to hold .010" maximum radius under the head and increase production, which was only 50 to 150 pieces per dressing.
The solution	Here is another notable solution to a difficult problem found through the use of a Cincinnati Grinding Wheel, backed up by a Cincinnati Machinist's experience in set-up and truing. The Cincinnati expert studied the problem, discussed it with production men, then prescribed a Cincinnati 2A100-N6-VL Grinding Wheel. Results: the maximum radius under the head of the rivets was held well within limits. And production was increased up to 800 pieces per dressing.

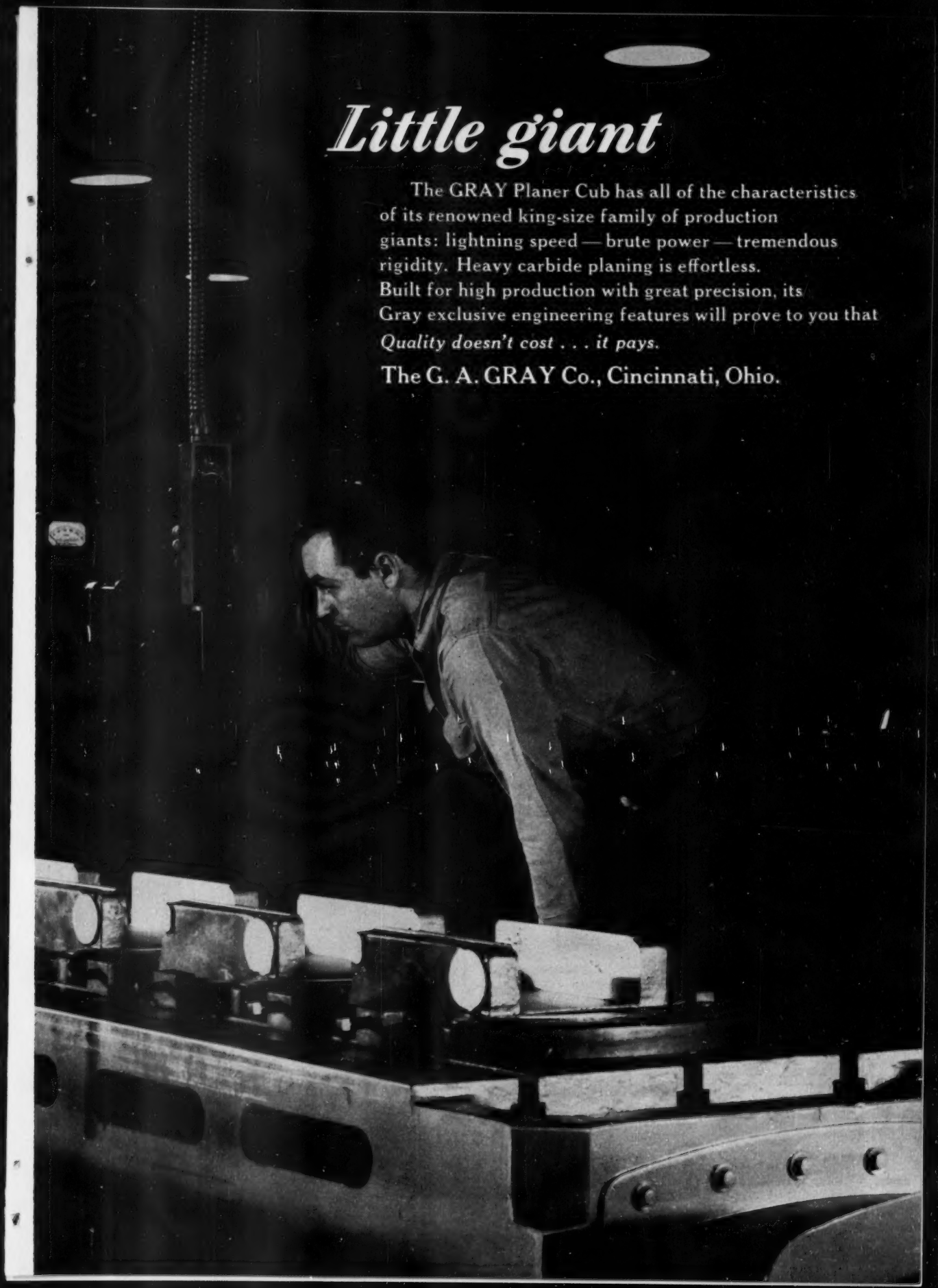


The stock removal problem in grinding aircraft rivets really had production men up in the air. A maximum radius of .010" under head had to be held and production of only 50 to 150 pieces per dressing had to be increased. For full story—and solution that increased production to 800 pieces per dressing—see Case History.

CINCINNATI
Grinding Wheels
THE CINCINNATI MILLING MACHINE CO.
Cincinnati 9, Ohio

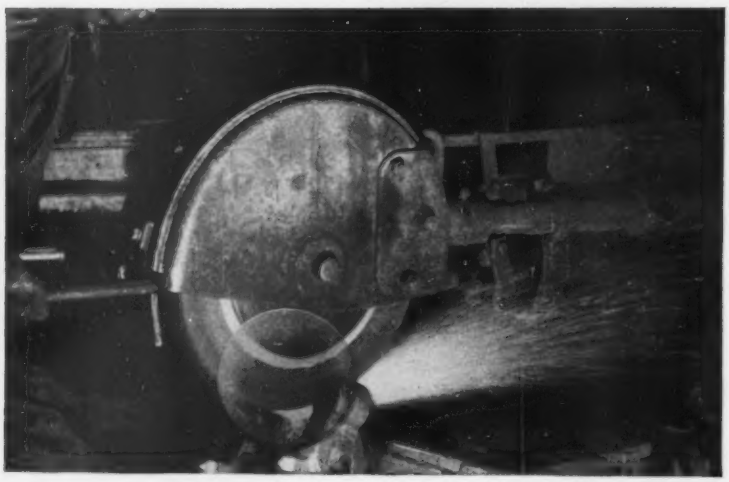



GRAY


Little giant
The GRAY Planer Cub has all of the characteristics of its renowned king-size family of production giants: lightning speed — brute power — tremendous rigidity. Heavy carbide planing is effortless. Built for high production with great precision, its Gray exclusive engineering features will prove to you that *Quality doesn't cost . . . it pays.*
The G. A. GRAY Co., Cincinnati, Ohio.

Brighten your rough grinding picture with this profit-boosting

"TOUCH of GOLD"



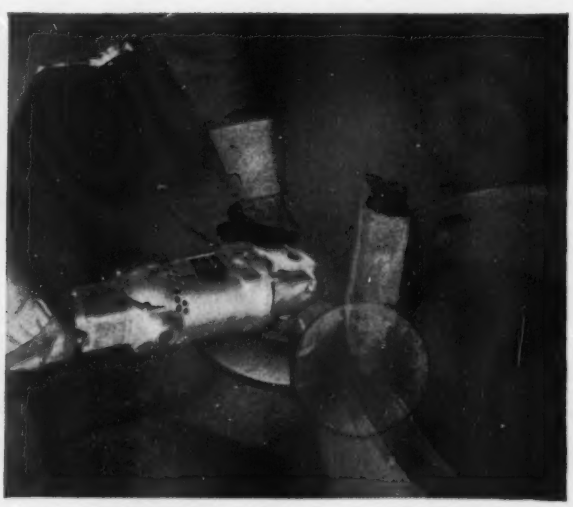
FOR YOUR SWING FRAME GRINDING, Norton wheels take heavy pressures and high speeds in stride. Their fast, clean-cutting action and extra long life assure more metal through your cleaning room per man-hour.

Profits from grinding actually begin with the first, most basic grinding operation — snagging. Yet the profit-potentials of rough grinding are apt to be more neglected than any other.

In your own rough grinding, Norton wheels can help bring every job up to its proper money-making level. Because you can get Norton wheels that are exactly right — in abrasive, in bond and in every other detail — for best results on all your jobs.

For proof, test Norton wheels against any others, under the same conditions. Your operators will like their easy-handling, clean-cutting action. And *you'll* like the way they grind off more metal per dollar, turn out better work and increase your production — bringing the real,

FOR YOUR BENCH AND FLOOR STAND GRINDING, Norton wheels combine exceptional cutting qualities with consistent wheel economy in a way that makes your grinding look good and your costs look better.



FOR MANY OTHER GRINDING JOBS, use Norton Nylon-Reinforced Hub Wheels — BD rigid and BFR semi-flexible. For work ranging from notching risers to weld finishing, they're the lightest, easiest, safest wheels made.

profit-boosting "Touch of Gold" to your rough grinding.

Your Norton Distributor

will gladly help you select the right wheels for your jobs and your machines. If necessary, he'll call your Norton Abrasive Engineer for expert advice on new or difficult applications. And with the world's broadest line to choose from, you'll get the wheels you need for better, lower cost grinding.

Booklet No. 1405 contains over 50 illustrated pages, covering every phase of rough grinding — including *your* jobs. Get it from your Norton Distributor. Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities, listed under "Grinding Wheels" in your classified phone directory. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Massachusetts.

W-1541

NORTON

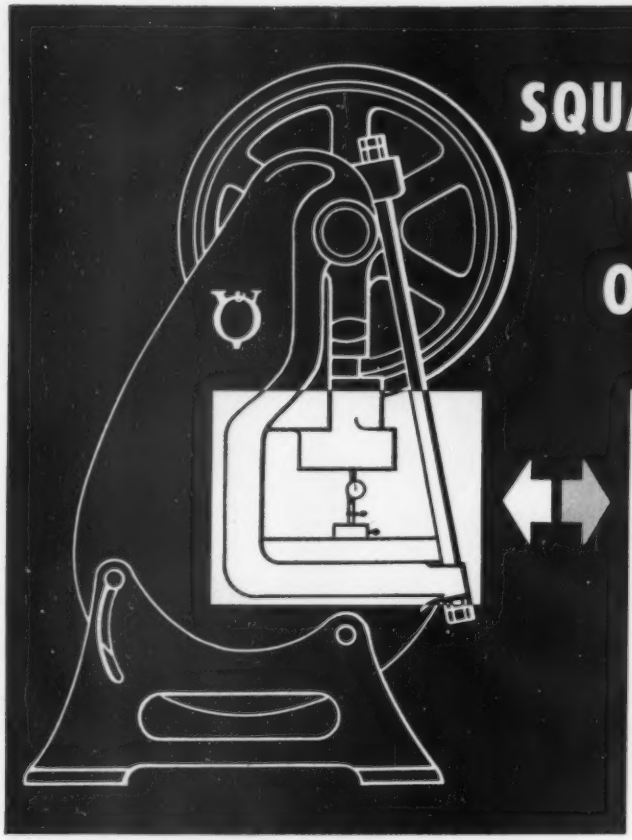
ABRASIVES

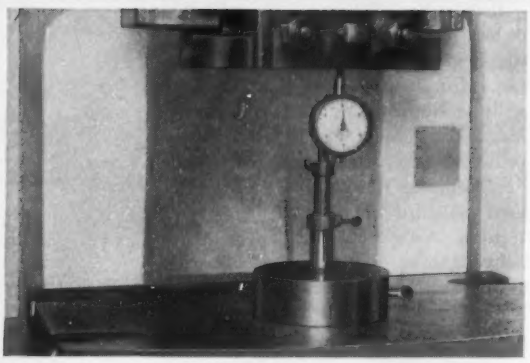
Making better products...
to make other products better

*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries

FOR YOUR PORTABLE GRINDING, Norton wheels have the inbuilt balance that reduces vibration and bounce, and makes them "hug that work." Results are faster grinding, longer wheel life, less operator fatigue — advantages that show up in your profit column. Use Norton ALUNDUM* abrasive on steels and steel alloys, CRYSTOLON* abrasive on gray iron and non-ferrous metals.

SQUARE AND PARALLEL WITHIN .0005" ON A 4" STROKE





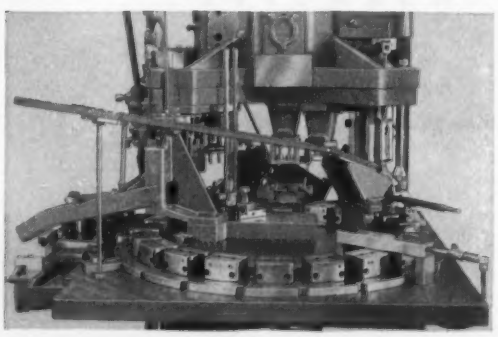
The dial indicator gage may not show a variance greater than .0005" when measuring any opposed points on these two surfaces. The same indicator is used with a ground steel square to check slide travel both F-B and R-L.

That sounds like a machine tool specification, doesn't it? Actually, it is a standard specification for a V & O long slide press: the press that is built like a high grade machine tool. We make special presses to even closer specs.

Operating precision of that order is very important if you want to use carbide dies, or fabricate thin materials, or do deep drawing, or work to high precision. You can do more, and do it better, when your press is highly accurate.

From our viewpoint, since we are going to use long slides we might as well build the rest of the press with accuracy to match. Otherwise, the precision of the long slide would be wasted. So we make extremely accurate ways and use them as reference surfaces with which all the tool carrying parts of the press must line up. And that gives you a press that will do a lot more for you.

Our representative would like to tell you more about the press that is built like a high grade machine tool. Write us, please.



Without high precision relationships between the tool-bearing surfaces and the slide travel of the press the maintenance costs of tooling of this complexity would be prohibitive.

Only the best is good enough

THE V & O PRESS COMPANY

DIVISION OF EMHART MFG. CO.

HUDSON, NEW YORK

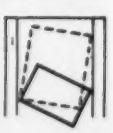
BUILDERS OF PRECISION POWER PRESSES AND FEEDS SINCE 1889

65th Anniversary

★ *STOP AND SAY HELLO AT ASTE SHOW-BOOTH 1056*

WHY THE V&O LONG SLIDE PROVIDES BETTER ALIGNMENT

With the same running clearance, the longer the slide the less the possibility for angular misalignment. And we keep our running clearances very close indeed.



Cut it Better-Faster-Cheaper . . . with

CARMET®

The Allegheny Ludlum line of Carmet Carbide Tools is *complete*—every style, size and grade you may need for any cutting job in the shop. If you make your own tools, a full line of blanks is available, too—as well as all necessary sizes of A-L Shank Steel. Extensive stocks of Carmet standard tools and blanks are carried in Distributor's warehouses coast to coast, and special tools are available to order. ● Just remember, for best performance on any application, *use Carmet! Allegheny Ludlum Steel Corporation, Carmet Division, Wanda and Jarvis Avenues, Detroit 20, Michigan.*

What other jobs have you for **CARMET** *to do*

We specialize in precision preforming of Carmet carbide metals to *any* shape for special wear-resistance needs, such as dies, gage blanks, etc. Let us quote on *your* requirements.

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CARMET CATALOG

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W&D 4925

AL® FINE TOOL STEELS SINCE 1854

New York City Skyline from New Jersey

Shostal Press Agency Photo

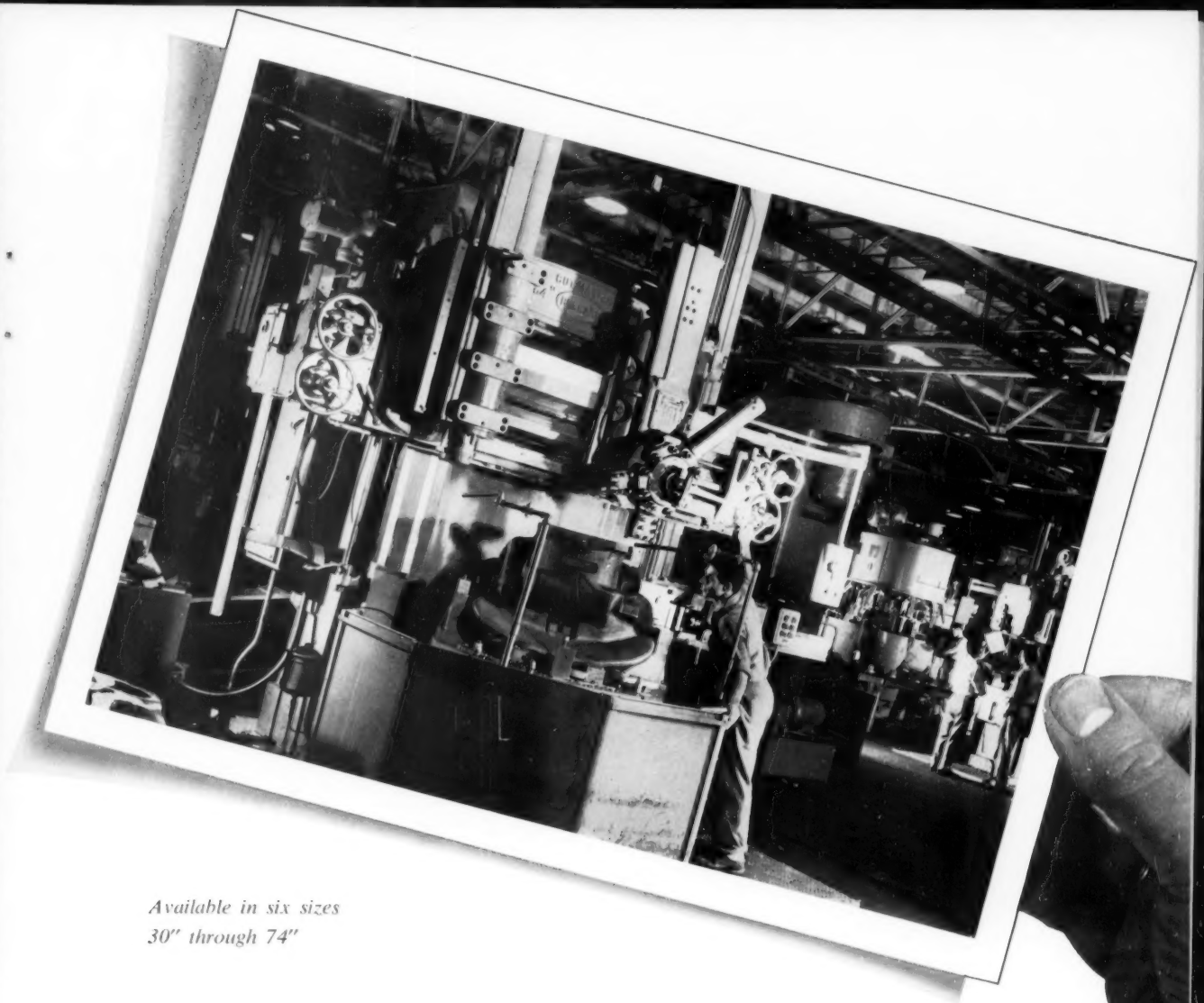
BULLARD

The Invisible Background of Industrial Progress

Modern high-speed roadways with their connecting tunnels and bridges make possible swift and economical surface movement of industry's raw materials and finished products from their source to the ultimate user. Those engaged in agriculture also depend on this means of transportation to move their produce from farm to processor to consumer. Modern American families rely on these modern roads in their pursuits of pleasure, vacation and business.

Likewise, *Modern Machine Tools* provide the manufacturers of road-building equipment, such as mechanical shovels, bulldozers, trucks and road rollers, with efficient means for manufacturing such essential equipment. Here then is "The Invisible Background of Industrial Progress."

THE BULLARD COMPANY • BRIDGEPORT 2, CONNECTICUT

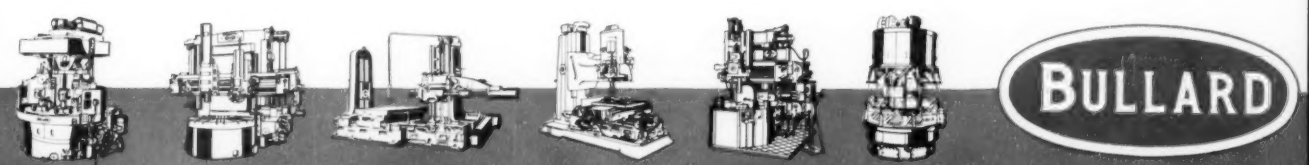


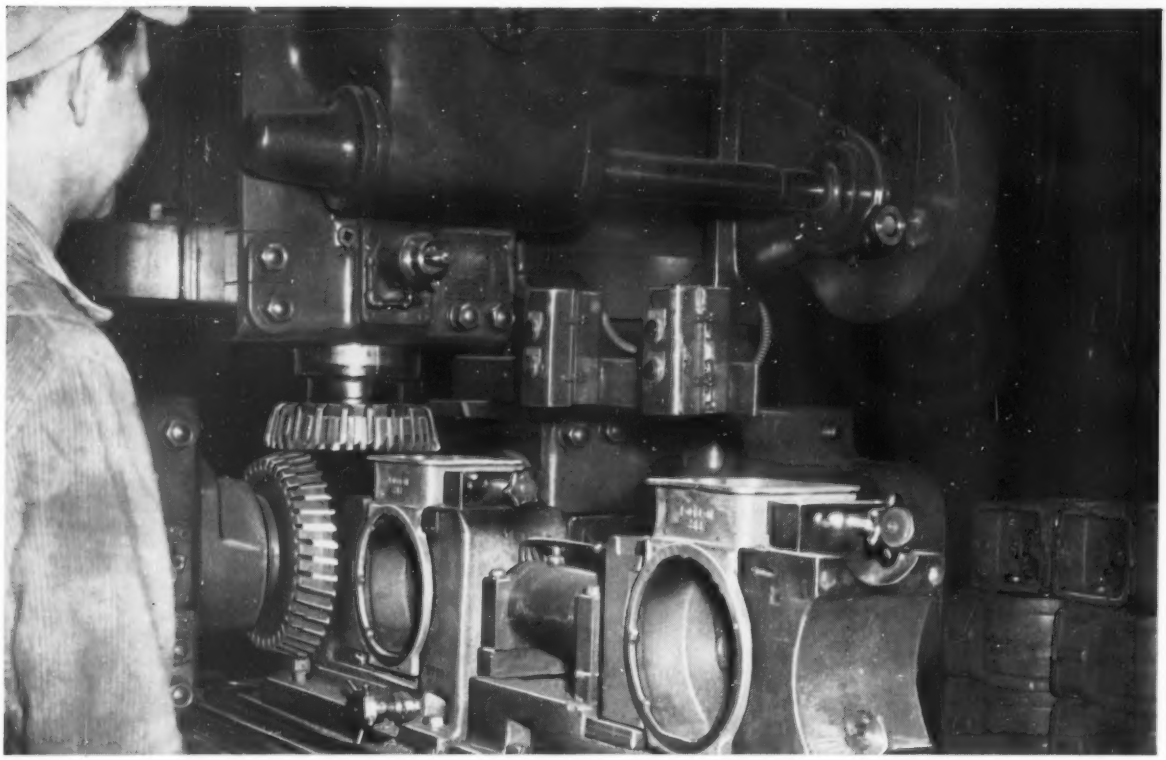
Available in six sizes
30″ through 74″

New products, new methods, new materials, and new cutting tools have out-dated many machine tools still in use. Is your plant operating under this handicap? If so, it will pay you to investigate the Bullard Cut Master Vertical Turret Lathe.

In the Cut Master, you will find a machine that incorporates outstanding engineering developments which make for increased production, ease of handling, accuracy, minimum operator fatigue and decreased maintenance cost. All these add up to greater profits through lower costs — so important in today's competitive market.

For full details on the Bullard Cut Master Vertical Turret Lathe, call your nearest Bullard representative or write to The Bullard Company, 286 Canfield Avenue, Bridgeport 2, Connecticut — phone 6-2511.





450 pieces per grind...
Despite Vibration

HAYNES STELLITE alloy milling cutter blades are being used successfully to machine gas-meter bodies, despite considerable vibration. The meter bodies have thin walls with respect to their other dimensions, and even though they are held in a rigid fixture, vibration cannot be completely eliminated. HAYNES STELLITE alloy tools have the toughness to withstand the chatter and also the red hardness to do the job fast.

Three milling heads, each containing 36 standard HAYNES STELLITE blades, face the flange at the top of the meter and straddle mill the two sides simultaneously. The tools previously used produced as few as 14 pieces per grind. HAYNES STELLITE tools produce an average of 450 pieces.

For information on how to use HAYNES STELLITE tools on your machining jobs, write for the new manual, "HAYNES STELLITE Metal-Cutting Tools."

HAYNES TRADE-MARK *alloys*

Haynes Stellite Company
A Division of
Union Carbide and Carbon Corporation
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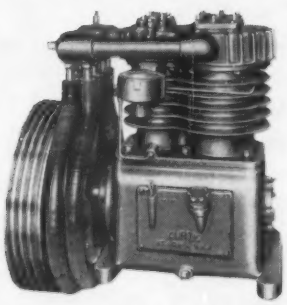
GET MORE PRODUCTION...PER MAN-HOUR

with the help of dependable, efficient

Curtis

AIR COMPRESSORS • AIR CYLINDERS • AIR HOISTS



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Tank mounted compressors
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TO LIFT, LOWER, PUSH, OR PULL *Curtis* Air Cylinders or Air Hoists Will Do The Job Quickly, Easily, and Economically — capacities up to 10 tons.

- low-cost trouble-free operation
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Pendant Air Hoist...
ideal for any lifting or lowering application.

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can be mounted horizontally or vertically for lifting, lowering, pushing, or pulling.

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of Curtis Manufacturing Company
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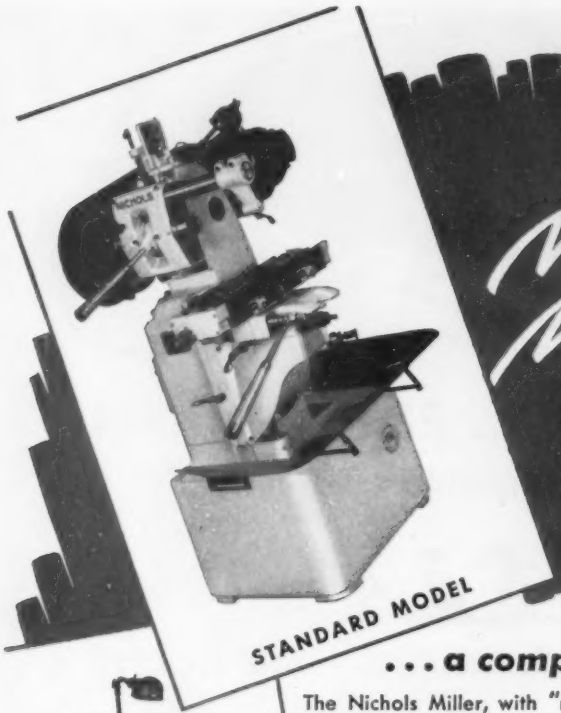
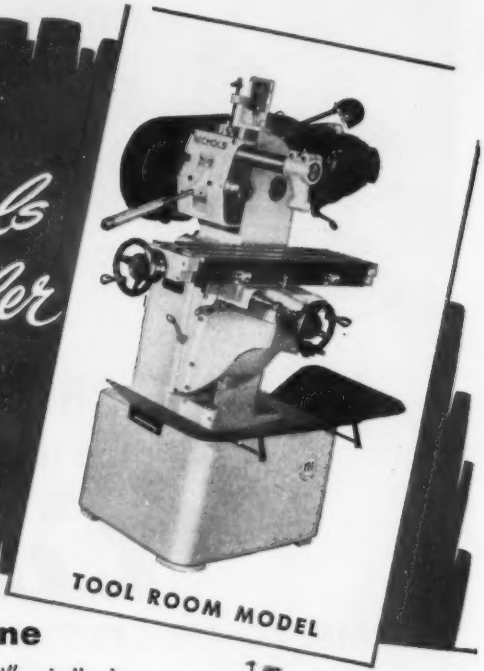
Nichols Miller



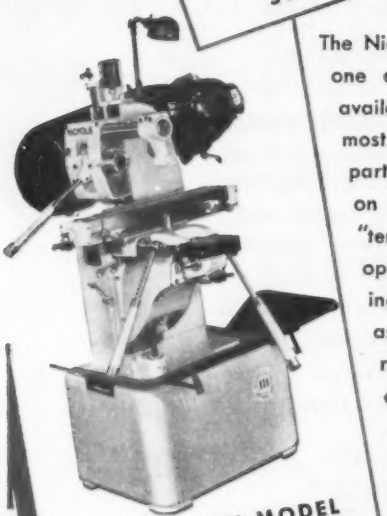
STANDARD MODEL



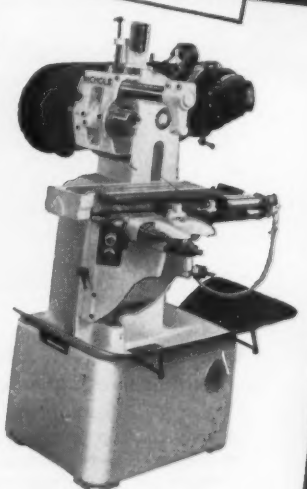
TOOL ROOM MODEL

. . . a complete line

The Nichols Miller, with "rise-and-fall" spindle, is one of the most precise, universal machines available today. The four models shown, fill most basic requirements—whether for single parts with simple set-up, or multiple operations on mass production jobs with tolerances to "tenths". Their versatility makes possible such operations as facing, boring, recessing, turning, slotting, key seating and contour milling, as well as regular milling. According to requirements, screw or lever longitudinal and transverse table feeds are available optionally. "The miller that uses its head" is your best choice—and one of industry's greatest values. If you want production to "tenths", investigate the Nichols Miller.



PRODUCTION MODEL



SEMI-AUTOMATIC MODEL

"the miller that uses its head!"

Write today for the Nichols general catalog, which describes the six models of Nichols Millers. A sound, color movie "the Miller that Uses its Head" is available for free showing. May we reserve it for you?

ASTE Show Booth 1431

CONDENSED SPECIFICATIONS

Table Working Surface	6¾" x 21" or 30"
Longitudinal Travel (screw or lever)	10" or 19"
Transverse Travel (screw or lever)	7"
Vertical Travel — Knee	13½"
Rise and Fall of Spindle	4½"
Selective Speed Ranges up to 5000 R.P.M.	
Weight	1250 lbs.

MANUFACTURED BY W. H. NICHOLS COMPANY WALTHAM, MASSACHUSETTS

NATIONAL DISTRIBUTORS **NICHOLS-MORRIS CORPORATION**

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No question if it's Card. **When you reach for a Card Tap you can be sure you have chosen the best. For built into every Card Tap are years of experience in tap making.**

Completely stocked offices at Atlanta, Chicago, Detroit, Fort Worth, Los Angeles, New York, San Francisco and Seattle

S. W. CARD MANUFACTURING CO., MANSFIELD, MASS. • DIVISION OF UNION TWIST DRILL CO. **TAPS • DIES • SCREW PLATES**

at one of the world's largest automotive plants 37¼ seconds for 28 operations

JOB FACTS:

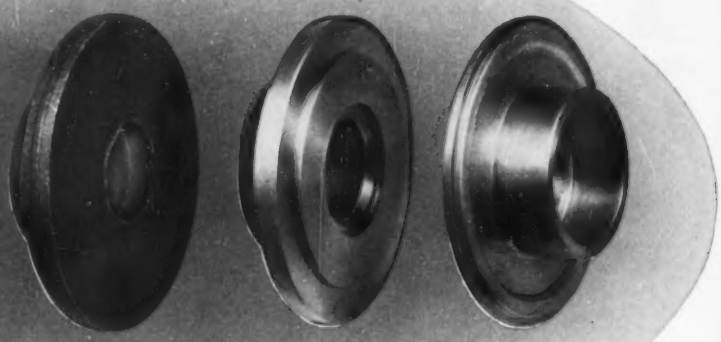
PART.....Torque Impeller Hub.
SIZE.....4" diam. 1¼" long.
MATERIAL.....Steel forging, SAE 1146 annealed
MACHINES: 6 inch model RPA-8 Acme-Gridley Chucking Automatics.

1ST MACHINE, with double index and duplicate tooling finishes 2 pieces per cycle—each with 11 identical operations. All carbide tooled.

Machine Time: 22½ seconds—320 per hour.

2ND MACHINE, single index with one set of tools completes opposite side to 17 operations. All carbide tooled.

Machine Time: 26 seconds—138 per hour.



WITH 100% CARBIDE TOOLING ON 8-SPINDLE

Acme-Gridley Chucking Automatics

IN this most competitive big business all planning must be toward higher consumer acceptance in both quality and purchase price—and leave a profit for the effort.

All three of these prime essentials begin with small parts such as these and hundreds of others made on multiple spindle chucking automatics.

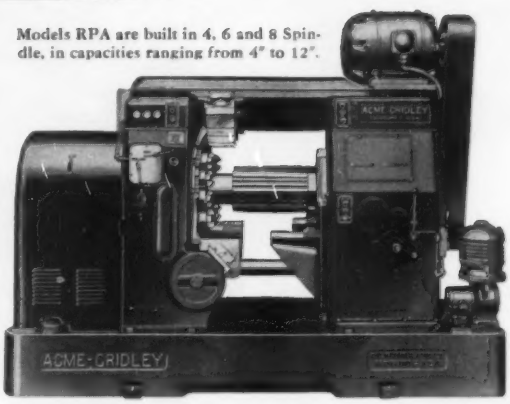
Alert, continuous and critical study is given to the most minute detail for manufacturing improvements, accepting only those which will:

- **save a fractional second in time per piece**
- **avoid rehandling on extra machines**
- **release valuable floor space**
- **relieve costly man-hours for other work**

—all to the end of achieving better components at lowered factory cost.

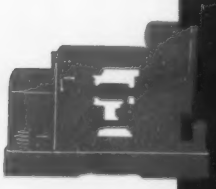
For more than 20 years Acme-Gridley machine design engineers and tooling specialists have helped meet these vital needs—by improving basic machine stamina, by ingenious applications of fastest cutting carbide tools, by simplifying operator effort. All of which applies to multiple chucking operations and to bar machine performance.

Models RPA are built in 4, 6 and 8 Spindle, in capacities ranging from 4" to 12".



Regardless of the particular kind of mass production parts, let us show you how to put Acme-Gridleys to work in your plant—MORE PROFITABLY.

Remember—your market also must be protected against competition if you expect to make a profit.



The NATIONAL ACME COMPANY

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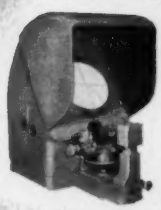
ACME-GRIDLEY BAR and CHUCKING AUTOMATICS

1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • Limit, Motor Starter and Control Station Switches • Solenoids • Contract Manufacturing

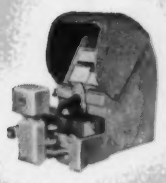
11 MODELS

3 SCREEN SIZES

Pedestal Type
14" Diam. Screen



Bench Type
14" Diam. Screen
4 Models



Bench Type
5¾" x 7¾" Screen
3 Models

Unsurpassed Inspection Versatility

JONES & LAMSON OPTICAL COMPARATORS

The Essence of Quality Control

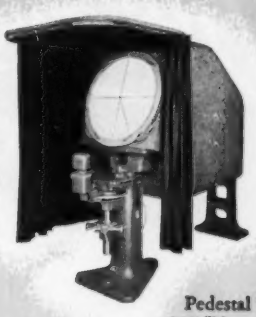
Jones & Lamson Optical Comparators are designed and built like rugged machine tools to withstand vibration and hard use. Yet they have the built-in accuracy to satisfy the most exacting laboratory standards.

- **They meet** the requirements of toolroom, laboratory and production inspection.
- **They precisely measure** height, depth, lead or spacing, as well as angles to degrees and minutes. They will measure to .0001".
- **They compare** intricately contoured parts with a master outline—and measure the amount of error.
- **They are convenient** to operate, easy to set up and read direct—*without computation.*
- **They operate** under normal lighting conditions. *No darkroom is needed.*
- **They will photograph** the enlarged shadow and record its relationship to a master chart.
- **Several persons** may study the shadow *at the same time.*
- **They will inspect** and measure surface contours, as well as profiles of objects such as type faces, stamping dies, punches, worn tools, etc.

Visit the J&L Booth No. 1509 at the ASTE Show.

Vertical Type
14" Diam. Screen

Direct Projection Type



Pedestal Type
30" Diam. Screen

P.S. → A complete line of STANDARD CHARTS and FIXTURES is maintained by us.

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Machine Tool Craftsmen Since 1835

COMPARATOR DIV.
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Jones & Lamson Machine Company
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Please send Comparator Catalog No. 402.

NAME_____ TITLE_____

COMPANY_____

STREET_____

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The Taft-Peirce 6" Rotary Grinder with .0001" vernier for super-precise rotary grinding.

The Taft-Peirce No. 1 Precision Surface Grinder with .0001' vertical and cross feed verniers for the highest degree of accuracy, flatness, and finish on plane surfaces.

When you want the *Ultimate in Accuracy* try this trio

The accumulated skill of the world's most experienced tool and gage makers has gone into these three machines . . . all originally developed *for our own gage production.* Each has been designed and built with the ultimate care to give the ultimate in accuracy, flatness, and finish. If accuracy is *your* problem . . . let us tell you about the unusual features of these machines.

The Taft-Peirce 24" Lapping Machine for *that last critical element of precision super-finish* on plane or cylindrical surfaces.

THE TAFT-PEIRCE MANUFACTURING COMPANY
WOONSOCKET, RHODE ISLAND

T-P *means* Top Precision

Fig. 1

producing this pulley assembly shows off the versatility of Hydroforming

Fig. 2

Fig. 3

Fig. 4

Fig. 5

In addition to drawing simple or intricate shapes, the Cincinnati Hydroform accomplishes simultaneously what are considered conventional *die set* operations. This is illustrated by the ingenious method used to produce the forming operations for the experimental short run pulley assembly shown in Fig. 1.

The pulley flange section (Fig. 2) was Hydroformed complete in *one* operation from a flat, 8″ dia. blank of 0.062″ cold rolled steel having a 2½″ dia. center hole. The walled hole was produced at the same time as the balance of the part by use of a piloted plug which formed the material into a recess in the punch. (See Fig. 3.)

The hub flange section (Fig. 4) was produced in *two* operations. The hub was first drawn using conventional Hydroform tools—a punch and draw ring. In the second operation, a ring was used to form the balance of the part. (See Fig. 5.) This combined a forming and a restriking operation which produced the required dimensional accuracy, including the sharp 0.060″ compound radii on the flange.

Thus the Hydroform can often be tooled inexpensively to do *more* than deep drawing and forming, saving operations which *further reduce* the cost of your development work . . . or your short run parts production. Let a Cincinnati Milling field engineer give you complete details. General Hydroform data and specifications of the 8″, 12″, 19″, 23″, 26″ and 32″ machine sizes are given in Bulletin M-1759-2. Write for your copy.

CINCINNATI **Hydroform**

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO, U.S.A.

Here's another reason it pays to get a proposal from Fosdick

We put a table on the

When Fosdick engineers put a table on the radial, a unique and basic machine tool was born. This machine combines the best features of two proven, reliable designs. It gives you the capacity and flexibility of a radial—the rigidity, compactness and convenience of an upright. It's the machine you need when you want versatility and economy in limited floor space.

The arm of the Sensitive Radial swings 360° on the rigid one-piece column. Controls are always at the same convenient height. Work is placed on the adjustable table, *or* on the base with the table swung out of the way. Drills up to 1½". 12" column, 3' or 4' arm, nine speeds, four feeds, 3 hp motor, reversing motor control for tapping.

For full information on the Sensitive Radial, ask for Bulletin SRA

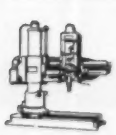
to give you

Variety problem solved at Lodge & Shipley

Building 46 lathe models from 14" to 60" requires plenty of production versatility. To drill and tap a broad variety of vari-shaped parts, *Fosdick's proposal* recommended the Sensitive Radial. Now Lodge & Shipley assigns tool blocks, levers, cam plates, spindles and many more complex parts to their Fosdick, knowing it will produce fast and easily. *Operation illustrated:* Tailstock spindle clamped to table vee. Drill, chamfer and tap 4 holes. 17/64" drill, 1020 rpm, .004 ipr, 7/8" deep. Chamfer, 1020 rpm. Tap 5/16" x 18 thread using Automatic Tapping Control (extra equipment), 240 rpm, 1/2" deep.

radial versatile production like this

Need Drilling Equipment? Get a Proposal from Fosdick!



Radial Drills

Jig Borers

Sensitive and Upright Drills

Sensitive Radial Drills

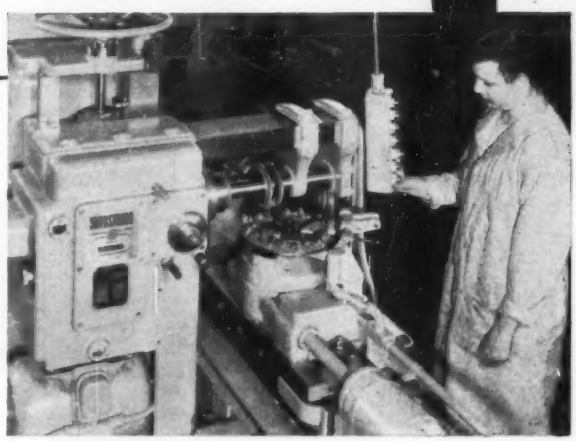
Automatic Positioning Machines

FOSDICK

THE FOSDICK MACHINE TOOL CO., CINCINNATI 23, OHIO

For Better Milling Methods and Lower Costs . . .

Use SUNDSTRAND Machines and "Engineered Production" Service



Profitable milling production can be obtained only by lowering unit production costs . . . obtaining the most economical solution to your milling problem and the most productive milling equipment in relation to your production requirements.

Basically, there are two approaches to solving these problems, (1) obtaining standard machines, then trying to process parts over these machines as economically as possible, (2) designing the most profitable processing method, then obtaining machines to suit this method — standard or semi-standard machines, if possible, or entirely special machines, if necessary. This latter method is Sundstrand "Engineered Production" . . . the most practical approach to economical milling. The following is a brief resume of the complete engineering and manufacturing service available from Sundstrand to meet all or any of your production milling requirements in small and medium size work.

These actual examples are presented to reveal one of each of the methods used in solving milling production problems. One of these methods may be the solution to your present problem.

1 Milling Lugs on Clutch Plates With Standard Rigidmil

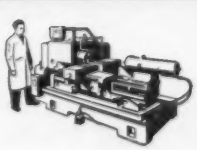
This is a Standard Sundstrand Model 22 Rigidmil equipped with a Sundstrand three station automatic index base. Three lugs on clutch plates ranging from 7″ to 12″ in diameter, are straddle milled at the rate of 54 pieces per hour. The operator locates the parts by means of a swing type radial locator and clamps part ready for machining. A gang of three cutters mills the slot in the center of the lug and mills two sides. Machine cycle is automatic and operator merely loads, locates and unloads the work.

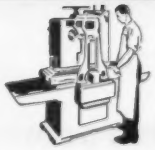
SUNDSTRAND

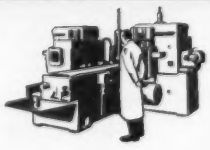
*"Engineered Production" Service**

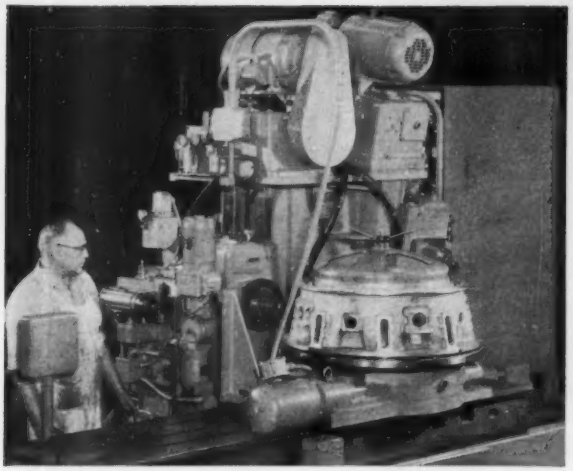
*REG. U.S. PAT. OFF.

AUTOMATIC LATHES | SIMPLEX RIGIDMILS | DUPLEX RIGIDMILS







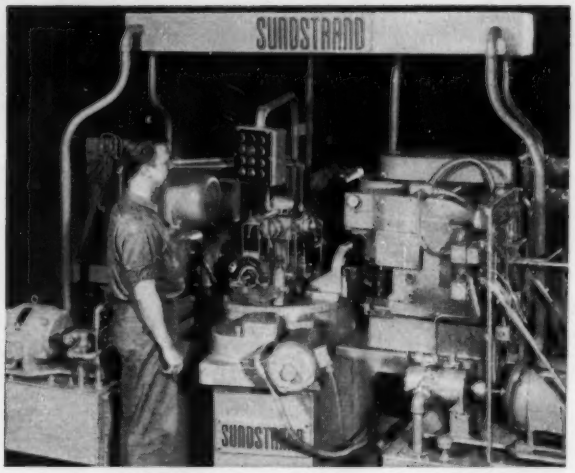


2 Milling Compressor Frames With Semi-Standard Rigidmil

This Sundstrand Model 33 Rigidmil has a single column on which a horizontal and special angular head is mounted. Angular head mills 8 angular pads on rear compressor frames and the horizontal head mills 13 other various sized pads.

Three different diameter cutters are used on the horizontal spindle, depending on size of pad to be milled. Cutters have quick change adaptors to facilitate speedy change over. Depth of cut on horizontal head is determined by setting of dogs.

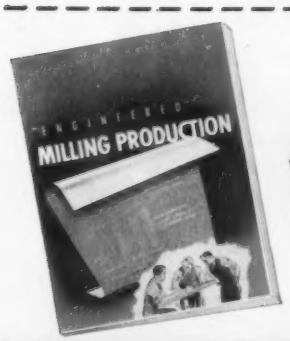
Table and head feeds are electronically controlled by operator who hand-regulates potentiometers thru a range of 2″ to 100″ per minute feed. Spindle speeds are controlled by pick-off gears. The special 30″ electric index base with 21 stations is push-button controlled.



3 Milling Piston Retainers With Special Rigidmil

Here is a Sundstrand Special Purpose Four Station Process Milling Machine for milling slots in Piston Retainers. Part is located and clamped on O.D. Operator loads and unloads fixture at Station No. 1 and pushes start button. Table indexes to the second station for milling a 7/16″ wide slot. A single spindle horizontal milling head is mounted on saddle ways. Saddle feeds up to mill and head and saddle return for index. At station No. 3 a 5/32″ wide slot is milled and table indexes to station No. 4. Unit at station No. 3 is identical to that at station No. 2. At station No. 4 a 3/16″ wide slot is milled in face of hub. This unit consists of a bedwing having horizontal ways with a vertical spindle milling head.

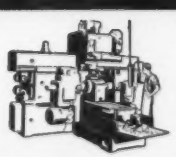
All milling units are interlocked with the index table for automatic operation. Production is 180 pieces per hour.

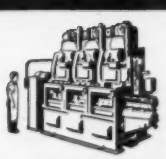


FREE DATA

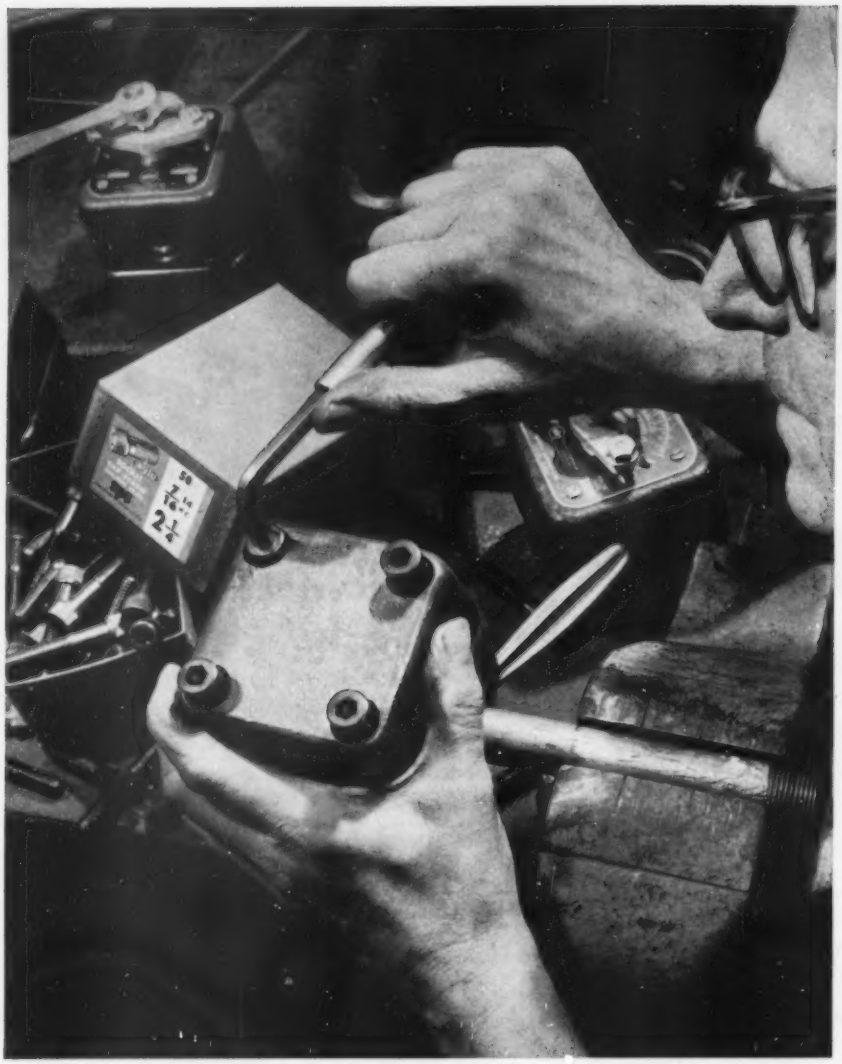
You'll find plenty of milling methods in this book . . . methods that may provide a short cut or profitable solution to similar jobs in your shop now. Tooling diagrams and machine designs are both included. Write for your copy today. Ask for Bulletin No. 141.

TRIPLEX RIGIDMILS | SPECIAL MACHINES

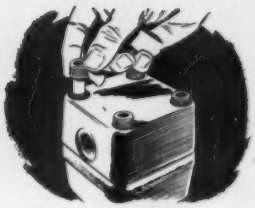




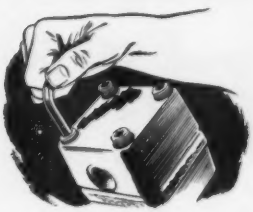
SUNDSTRAND
Machine Tool Co.
2533 Eleventh St. • Rockford, Ill., U.S.A.



Four UNBRAKO Socket Head Cap Screws speed assembly in the plant, and reassembly in the field, of these flow-control valves providing 16 different inlet-outlet flow direction combinations.



The knurling on the head of the screw permits faster assembly, because it provides a slip-proof grip.



The uniform depth and size of the hex socket assure maximum torque in wrenching. The accurate diameter of the head permits countersinking.

UNBRAKOs—made of heat treated alloy steel—have fully formed threads, Class 3 fit; controlled fillet and continuous grain flow for strength. Supplied in standard sizes from #4 to 1".

Get personalized service, faster delivery with UNBRAKO Standards—stocked by your distributor

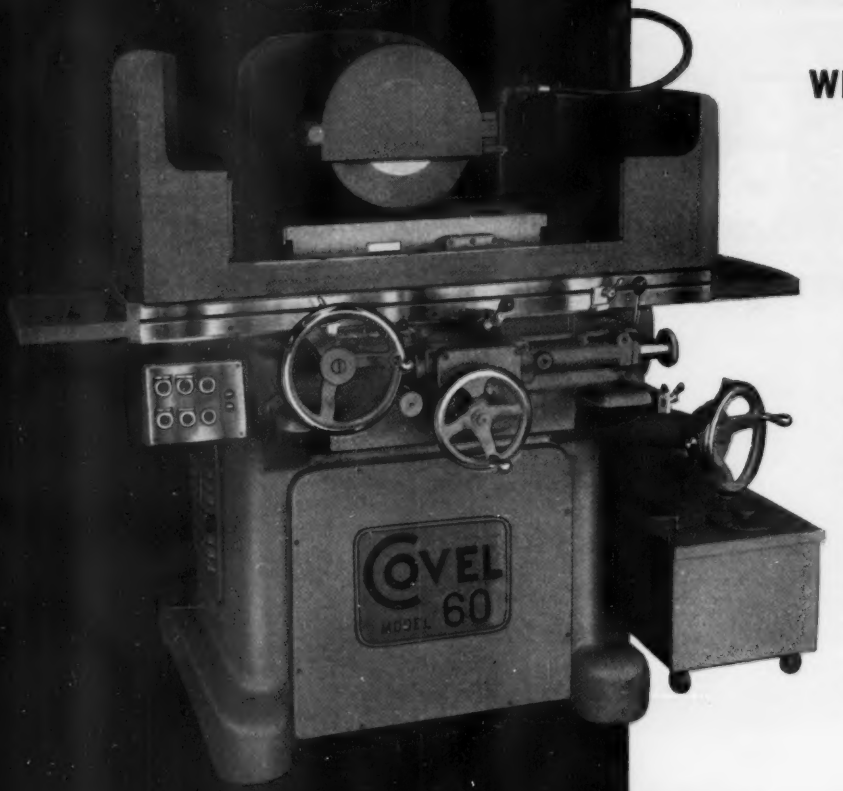
When you use UNBRAKO socket screw products, you get the finest socket screws made, *plus* the personalized service and the faster delivery of your local distributor. And he enables you to cut your inventory, set up more space for production. For more information, write for UNBRAKO Standards—a complete listing of precision socket screw products carried by your distributor. STANDARD PRESSED STEEL Co., Jenkintown 1, Pa.

UNBRAKO® SOCKET SCREW DIVISION

SPS JENKINTOWN PENNSYLVANIA

COVEL No. 60 SURFACE GRINDER . . . ENTIRELY NEW

WITH 15" CROSS FEED



Covel presents the No. 60 — latest in its 80-year line of precision machines . . . This ultra-modern surface grinder features a 14" x 24" work surface . . . 15" width of cross feed . . . 27" table travel . . . vertical work capacity of more than 18" . . . automatic, closed circuit hydraulic system . . . powered elevation and a long list of advantages best described in a new bulletin . . . yours for the asking.

Here's a Typical Use:
This new "60" is set up for wet grinding the surface of a trim die for die castings — but one of the wide range of tool room and production jobs for which this latest Covel grinder is suited.

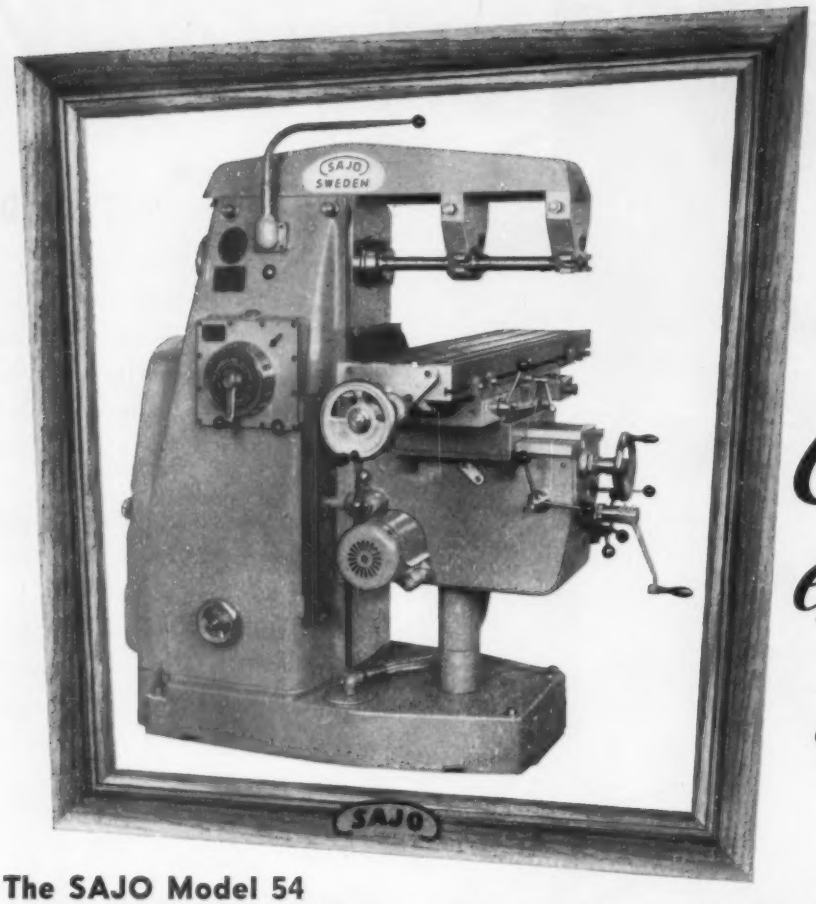
WRITE FOR *New Bulletin* No. A-54

80 YEARS of continuous manufacturing experience makes your COVEL choice a sound one.

COVEL PRECISION GRINDERS

BENTON HARBOR, MICHIGAN

DRILL GRINDERS • UNIVERSAL CUTTER & TOOL GRINDERS • HYDRAULIC & HAND FEED SURFACE GRINDERS



Classic example

OF SWEDISH
CRAFTSMANSHIP

The SAJO Model 54
No. 2 ALL-GEARED Milling Machine, Plain or Universal

is an outstanding example of Swedish craftsmanship and fine quality materials, combined in a modern design.

Capable of continuous dependable service under the most severe conditions and guaranteeing maintenance of accuracy to tenths, the SAJO Model 54 Millers meet all requirements for:

ASTE SHOW BOOTH 1334

POWER . . . . . 7½ HP motor drive to spindle (5 HP optional).
1½ HP table feed and rapid traverse motor.

RANGE . . . . . 16 spindle speeds 39-1500 RPM (optional 31-1200 RPM).
12 table feeds 11/16" to 25"/min. longitudinal and cross.
11/32" to 12½"/min. vertical.
Power rapid traverse 80"/min. longitudinal and cross. 40"/min. vertical.
Table travel longitudinal 33½". Cross 10". Vertical 18".

ACCURACY . . . . Handscraped sliding surfaces, Spindle (#50 NMT taper) mounted in four precision SKF bearings ensuring constant smooth operation and fine finish.

SIMPLICITY . . . . . Single adjustable START-STOP-BRAKE lever, Dial selection of speeds and feeds.

Priced well below levels of comparable top grade millers.

Prompt delivery. Full selection of accessories available.

Also available: SAJO No. 2 Light Duty Plain or Universal Millers.

For information write to:

austin industrial corp.

76-F MAMARONECK AVE., WHITE PLAINS, N.Y.
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Look for the Austin Seal—your full guarantee of satisfaction.

INCREASE YOUR QUALITY PRODUCTION

... by applying the PRECIS-O-NIZING capabilities of the Microhoning process to your work.

Microhoning is *the* industrial process which simultaneously gives you

- **stock removal**
- **geometric accuracy**
- **size control**
- **controlled surface finish.**

This functional, controlled-abrading process . . . combining quality with production speed . . . has been the answer to problems in the generation of thousands of cylindrical and flat surfaces of every size and kind of material.

Micromatic equipment assures you of experienced engineering proficiency that has developed *MICRO-HONING MACHINES—TOOLS—FIXTURES* for every major engine manufacturer in the world.

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REPRESENTATIVES: Allied Northwest Machine Tool Corp., 103 S.W. Front Avenue, Portland 4, Oregon. • Tidewater Supply Co., Charlotte 4, North Carolina.

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Hydraulic controls • Diesel fuel injection equipment

intricately machined MAX-EL alloy steel part shows minimum distortion after heat treatment...

Halliburton Oil Well Cementing Company, Duncan, Oklahoma, selected hot rolled MAX-EL 3½ bar stock for the valve shown. It's an important part of their 5⅞" tester, used to sample fluids or gases during drilling operations, sometimes 15,000 to 20,000 feet below the surface.

The valve is machined in the annealed condition and then heat-treated. Even though it varies considerably in thickness, no distortion problems are encountered in this MAX-EL part.

Try MAX-EL in your shop. You'll like its better machinability, freedom from distortion and over-all quality. And you'll get longer tool life . . . more pieces per grind. Call Crucible for immediate warehouse delivery of MAX-EL steels.

CRUCIBLE first name in special purpose steels

54 years of Fine steelmaking **ALLOY STEELS**

CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.

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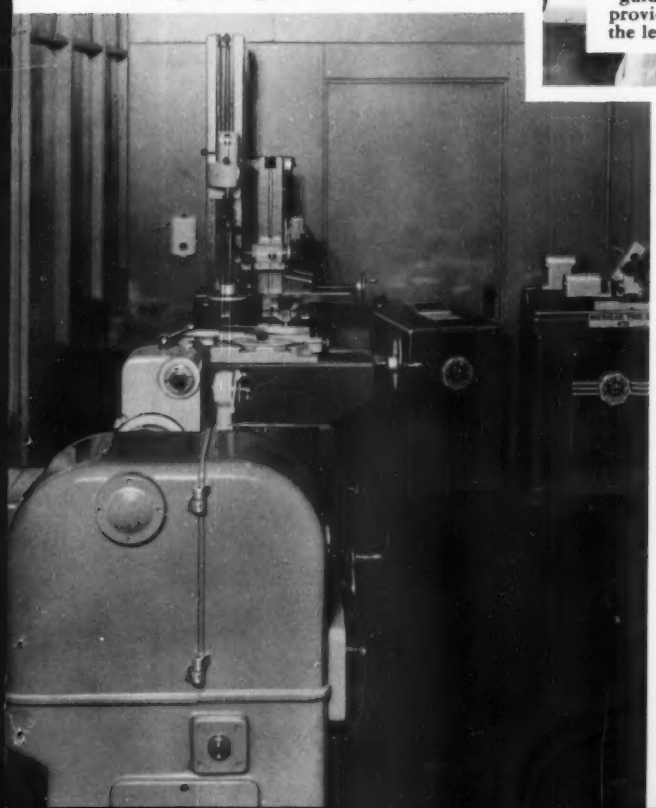
SHAVING—Tractor transmission clusters are shaved automatically on this Michigan 870. Gears are 1.6429″ and 2.000″ P.D.—23 and 28 tooth. Sizing fixtures, chute loading, and automatic expanding mandrels, plus automatic machine cycle, give an average rate of four per minute for each gear. Changeover requires but a few minutes.

This Month's

GEAR PIX

SHAVING—Both helicals on this big marine herringbone gear are shaved at the same time on this Michigan V-120 gear finisher. Michigan "guided" cutters for shaving large wide-face gears provide added accuracy, especially accuracy of the lead.

CHECKING—One corner of a modern gear laboratory in a large automotive plant. Michigan Sine-Line 1205 lead checker is in foreground, Sine-Line 1124 involute checker in corner with Michigan MTR recorder, and Michigan 471 gear checker at right.



CUTTING—Michigan Shear-Speed gear shaper cuts both spur gears on this truck transmission cluster. All teeth on the larger gear (33 teeth, 5.34″ diameter, 1⅛″ face width) are cut simultaneously in 2.74 minutes.

MICHIGAN TOOL COMPANY

7171 E. McNICHOLS RD. • DETROIT 12, MICH.

Over

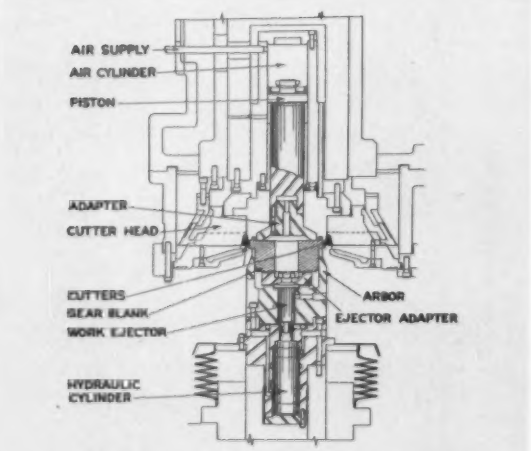
This Month's

GEAR PIX

CUTTING—Shear-Speed gear shaper cuts 125 transmission gears per hour—500 gears between tool sharpenings—floor space 49 sq. ft. as compared to 312 sq. ft. by former methods. Gears are 2.500" P.D. Pitch diameter is held concentric to internal major spline diameter within 0.0025" total indicator reading.

SHAVING—Instrument gears up to 4" diameter are shaved to extreme accuracies at high production rates on this Michigan 861-4B (one of a battery) in an eastern plant. Note magnetic chip separator to insure chip free coolant.

SPEEDING—Speed testing of mating gears in a modern transmission plant will be the job of this battery of seven Michigan model 1126 gear speeders. Machines are standard, fixtures are custom made.



CLAMPING—Automatic pneumatic clamping and manual hydraulic ejection are available on all models of Michigan Shear-Speed gear shapers now. Details are shown in the drawing above.

MICHIGAN TOOL COMPANY

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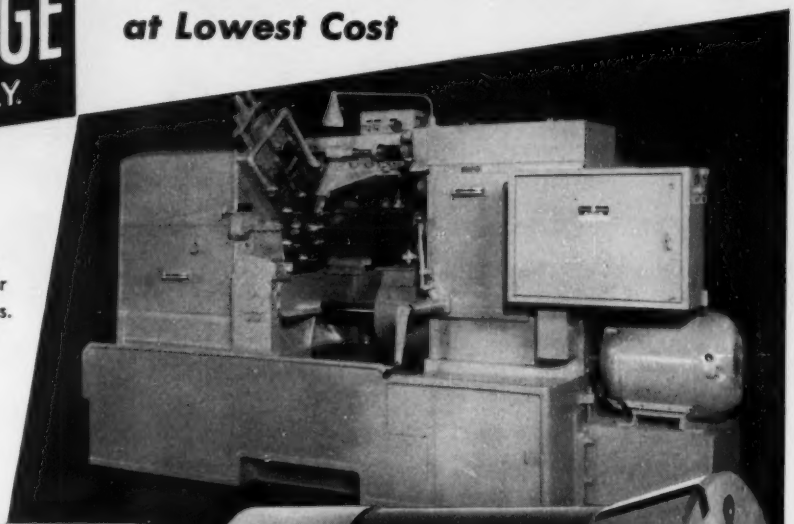
HARDINGE COLLETS and FEED FINGERS
for NEW BRITAIN Automatics*

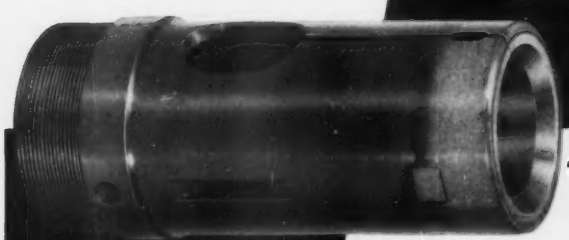
HARDINGE
ELMIRA, N.Y.

Assure Maximum Production at Lowest Cost

Reduce tooling costs and step up production on your New Britain Automatics with HARDINGE customer shop-proved collets and feed fingers.

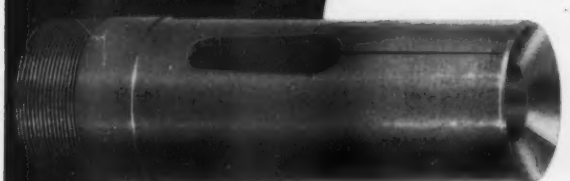
** Also available for the following automatics: Cone, Greenlee, Gridley and Acme-Gridley, National Acme.*





HARDINGE Style "B" Master Feed Finger

HARDINGE Style "S" Master Collet



HARDINGE Regular Feed Finger

HARDINGE Regular Collet

Immediate

Stock Delivery

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Choose for your requirements:

Hardinge Master Collets and Feed Fingers . . .
The only master collet with no work pressure on the screw.
Pads are completely interchangeable among machines of similar capacity.

Hardinge Regular Collets and Feed Fingers . . .
Precision made, hardened and ground internally and externally.

One source of supply for all collets and feed fingers.

HARDINGE BROTHERS, INC., ELMIRA, N.Y.

Fairbanks-Morse saves floor space,

In machining electric motor shafts, Fairbanks-Morse uses a Hydra-Trace attachment mounted in place of the compound rest on a LeBlond 16" Heavy-Duty Engine Lathe. This shaft is machined from 3¼" 1245 steel bar stock. Rough and finish cuts are run at 318 rpm (average, 325 sfm) with the feed set at .0168 ipr. .012" to .015" surplus stock is left for finish grinding.

slashes tool costs with Hydra-Trace

LeBlond Lathe plus Hydra-Trace replaces two automatics—machines 55 different shafts in lots of 25 to 150.

Before Hydra-Trace, F-M produced its motor shafts on a pair of automatic lathes. Each turned one end of the step shafts; each used seven tools and two tool blocks. Frequent set-up changes—*each requiring eight hours*—more than ate up the time saved by automatic production.

Then Fairbanks-Morse consulted our Chicago office, purchased a 16" Heavy-Duty Engine Lathe equipped with Hydra-Trace. Here are the results:

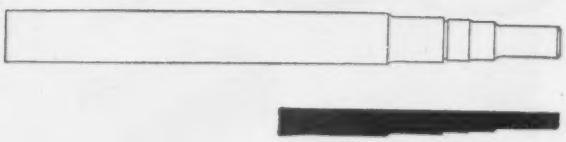
Set-up time became Production Time. Hydra-Trace setup per shaft end takes only 15 minutes—for a total of 30 minutes. Result—7½ former setup hours became available for production.

Floor space saved. One machine does the work of two. (Overall average production is equal.)

Tool costs slashed. Two tools replace 14. Tool life increased 33%.

Storage problem simplified. Hydra-Trace templates are flat, easily made, much simpler to store and locate than bulky tool blocks (or master shafts).

Hydra-Trace can replace the compound rest of virtually any LeBlond lathe built since 1935. And operators of only average skill can easily operate this heavy-duty, hydraulic tracer.



A typical shaft-turning operation—Hydra-Trace automatically follows template 1 as first-phase rough and finish cuts are taken on one run of shafts.

Then, the shaft ends are reversed. The second template is set and the second machining phase completed.

Whether you are cutting step shafts, contour facing or turning forms—a LeBlond Heavy-Duty Lathe with Hydra-Trace will prove the most versatile, the most dependable machine in your shop. You can use it as a duplicating lathe on production runs; then, in minutes, replace the Hydra-Trace attachment with the standard compound rest for regular work.

For more information on LeBlond Heavy-Duty Lathes, see your nearby LeBlond distributor or write—

THE R. K. LEBLOND MACHINE TOOL CO. CINCINNATI 8, OHIO

Write for Bulletin HT-4A
for the complete Hydra-Trace story.

*TRADE MARK, Registered U.S. Pat. Off.

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LeBLOND *of Cincinnati*

WORLD'S LARGEST BUILDER OF A COMPLETE LINE OF LATHES • FOR MORE THAN 64 YEARS

Barber-Colman

FORMED CUTTERS

designed for peak milling efficiency, consistent form duplication, accuracy and long cutting life

Cutters specially designed and manufactured for your form milling operations give you greater cutting efficiency, the most practical means of combining cuts, and reduced milling costs. Depending upon the accuracy you require, these cutters can be furnished with either ground or unground form.

Barber-Colman uses new manufacturing controls and production equipment to give you the most accurate, long-lived formed milling cutters available.

For your special form milling requirements, call a Barber-Colman cutter specialist. He will be glad to assist you with your particular production needs.

BARBER COLMAN

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GENERAL OFFICES AND PLANT, 813 ROCK STREET, ROCKFORD, ILLINOIS

Specialists in

milling cutters, profile or formed, ground or unground thread milling, special problems

How times have changed!

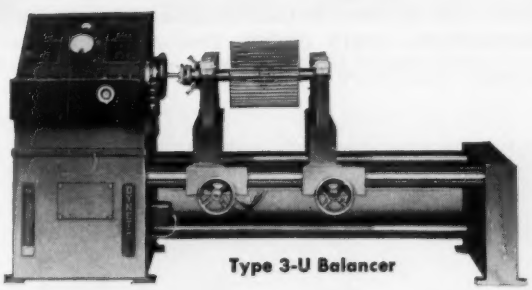
for instance:

This was transportation . . . . **NOW** this is it.

This was the best cleaner . . . . until we got **THIS.**

The old rub-a-dub washdays . . . . gave way to **THIS.**

This was a balancer . . . . . . **until we built THIS!**



Type 3-U Balancer

Any job worth doing is worth doing *right!* And with today's precision manufacture and high-speed rotating parts, that applies to balancing more emphatically than ever.

If your work involves balancing, do it the *modern* way—with Gisholt DYNETRIC Balancing Machines. Here's unrivaled speed that enables you to locate and measure unbalance in a matter of seconds—unequalled accuracy, capable of detecting vibrations as small as .000025".

Gisholt Balancers are available for handling all kinds of rotating parts, from a fraction of an ounce to many tons. Write us for a copy of the booklet STATIC & DYNAMIC BALANCING.

DYNETRIC BALANCERS

GISHOLT

MACHINE COMPANY

Madison 10, Wisconsin

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

OVERSIZED COSTS

INSPECTION COSTS DROP! These three Federal Electricator Gages inspect two diameters, a shoulder distance and overall length of tiny watch parts . . . simultaneously. Signal lights tell when dimensions are off-size. DIAL INDICATORS SHOW HOW MUCH.

ACCURATE ASSEMBLY! Here's how a Federal Dial Indicator is used in balancing and adjusting gears at assembly of an automatic pilot.

FULL LENGTH INSPECTION! This Federal Continuous Measuring Gage checks full length diameter of hard rubber tubes as they emerge from centerless grinder. Signal lights show operator when tube diameters are within, over or under tolerances. This gage can be modified for COMPLETELY AUTOMATIC SORTING.

MEASURABLY REDUCED!

COST-CUTTING PROGRAMS PAY OFF only when process, production and quality control engineers use up-to-date methods and equipment. How much are out-moded gages handicapping *your* progress?

COSTS CAN BE CUT SEVEN WAYS when modern Federal Gages take over:

1. **Reduction in undersize dimensions and oversize holes** which scrap up to 10% of production.
2. **Less rework on oversize work** which hogs as much as 30% machine time in some plants.
3. **Material costs cut** through purchase of smaller-sized stock, made possible by holding work to closer tolerances.
4. **Inspection time halved** when visual indicating gages replace ordinary micrometers, vernier calipers and fixed gages. Even higher savings result when Federal multi-dimensional and sorting gages are used.
5. **Quality control simplified** by gages that warn machine operators *before* they produce scrap.
6. **Assembly speeded** when visual indicating or automatic sorting catches out-of-tolerance parts formerly overlooked because of human error.
7. **Gaging costs cut** when Federal MODIFIED STOCK GAGES eliminate need for costly special gage engineering.

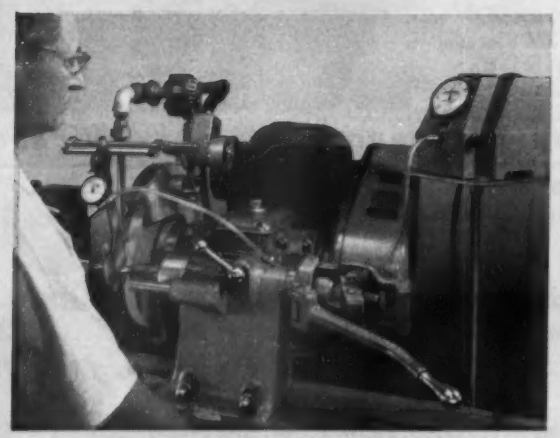
INVESTIGATE! Catalog 52 shows Federal Gages which help cut costs all along the line. Write for your copy today. Federal Products Corporation, 4123 Eddy St., Providence 1, R. I.

DON'T MISS IT! 1954 INDUSTRIAL EXPOSITION
PHILADELPHIA CONVENTION CENTER APRIL 26-30 Incl.

Ask **FEDERAL**

FOR ANYTHING IN MODERN GAGES... **Visit Booths 315 — 321**

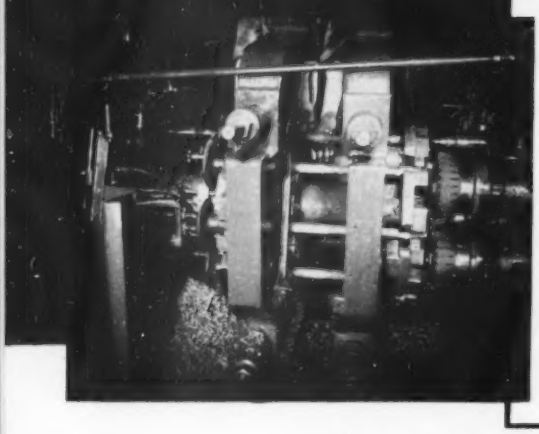
DIAL INDICATING, AIR, ELECTRIC OR ELECTRONIC — FOR INSPECTING, MEASURING, SORTING OR MACHINE SIZE CONTROL.



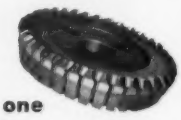
ACCURACY and OUTPUT INCREASED! Here, the new FEDERAL ARNOLDAIR unit is applied to the well known Arnold continuous grinding gage. This makes faster and more positive dial reading. Work is ground to required dimensions more positively, with less human attention.

MULTIPLE MEASUREMENTS AT A GLANCE! This operator is measuring the concentricity of the pitch diameters of two sets of teeth by means of the center Indicators. With the same gage she then checks the concentricity of the hole at each end of the gear in relation to the body O.D.

These jobs prove it!



ACTUAL JOB: Rough and finish mill spline end of rear axle shaft at large automotive plant.



Savings of over $14,225 per year on one machine with one set of Wesson tools

Old Method	New Wesson Method
Cost 1 set inserted blades....$48.00	Cost 1 set Inserted Blades....$54.60
Pieces per Grind.....275	Pieces per Grind.....1600
Grinding Hours per year. 10,300	Grinding Hours per year.....2500
5 Machines Running 3 Shifts	3 Machines Running 2 Shifts
Machine Repair per year $25,000	Machine Repair per year...$1200
Tool Cost per Piece.....$.00545*	Tool Cost per Piece.....$.00213*

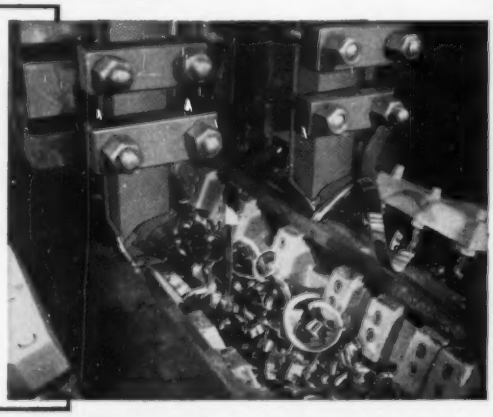
*(Machine repair and grinding costs not included)

HOW IS YOUR PRODUCTION SCORE CARD?

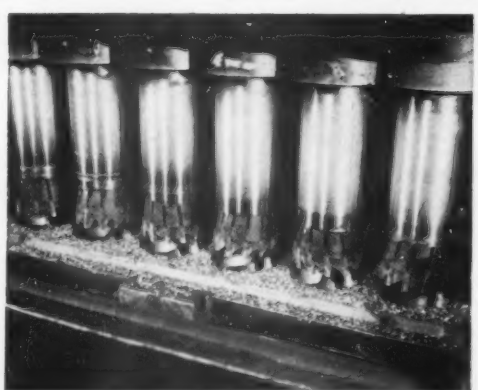
ACTUAL JOB: Using Rockford planer to form cutting edge for a caterpillar bulldozer scraper blade.

On only one machine with one Wesson tool savings of over $5900.00 per year

Old Method	New Wesson Method
Pieces per Grind.....½ to 1	Pieces per Grind.....13½
Total Tool Cost.....$49.25	Total Tool Cost.....$97.16
Average Pieces per tool life.....24 Pieces	Average Pieces per tool life.....324 Pieces
Cost per Piece.....$.60	Cost per Piece.....$.07



HOW IS YOUR PRODUCTION SCORE CARD?



ACTUAL JOB: Rough bore cylinder block on Ingersoll, 6 spindle, boring mill at large farm Implement Mfg. Co.

Over 300% dollar savings per tool

Old Method	New Wesson Method
Pieces per Grind.....836	Pieces per Grind.....3160
Cost of Tool.....$49.68	Cost of Tool.....$172.80
Grinding Cost per sharpening.....$11.70	Grinding Cost per Sharpening.....$8.78
Tool Cost per 100 Pieces.....$2.588	Tool Cost per 100 Pieces.....$0.642

On *only* one machine with Wesson Tools Savings of over $900 per year

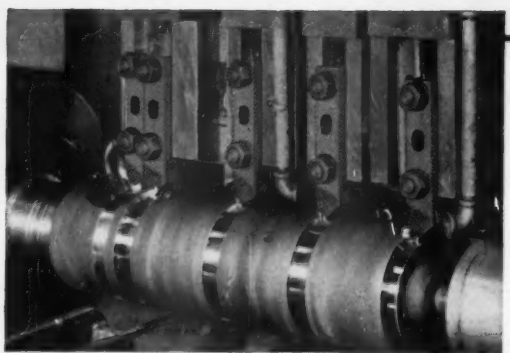
WESSON COMPANY

1220 WOODWARD HEIGHTS BLVD. FERNDALE (DETROIT 20), MICH.

WESSONMETAL
Carbide Blanks
A Tip To Quality

TOP PERFORMANCE *is possible only with* TOP TEAMWORK!

WESSON
Carbide Cutting Tools
ENGINEERED FOR CARBIDE



ACTUAL JOB: Rough turn hot forged 155 mm shells at Large Shell Mfg. Plant with Wesson Multicut Parallelogram Band Type Holder.

Another FIRST for WESSON with tool costs reduced by over 60% Production Increased 400%

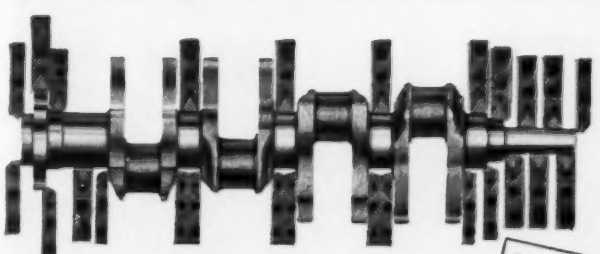
Old Method		New Wesson Method	
Tool Cost	$37.50	Tool Cost	$50.00
Useable Carbide	3/8"	Useable Carbide	9/16"
Average Pieces per Grind	60	Average Pieces per Grind	60
Pieces Machined per Tool	420	Pieces Machined per Tool	1680
Tool Cost per Piece	8.1c	Tool Cost per Piece	2.9c
Down Time for Tool Change	15 min. every hour	Down Time for Tool Change	4 min. every hour

HOW IS YOUR PRODUCTION SCORE CARD?

ACTUAL JOB: Crankshafts being turned for first time at large Automotive Plant with Wessonmetal solid carbide inserts in Wesson Multicut Band Type Tool Holders.

Here's Outstanding Performance! An average of 9000 pieces per insert before sharpening

Old Method	New Wesson Method
Pieces....11 per hour	Pieces....48 per hour
Cycle time.1 min. 55 seconds	Cycle time....40 seconds
Cranks per tool change (average)....1.7 pieces	Cranks per tool change (average)..1500 pieces



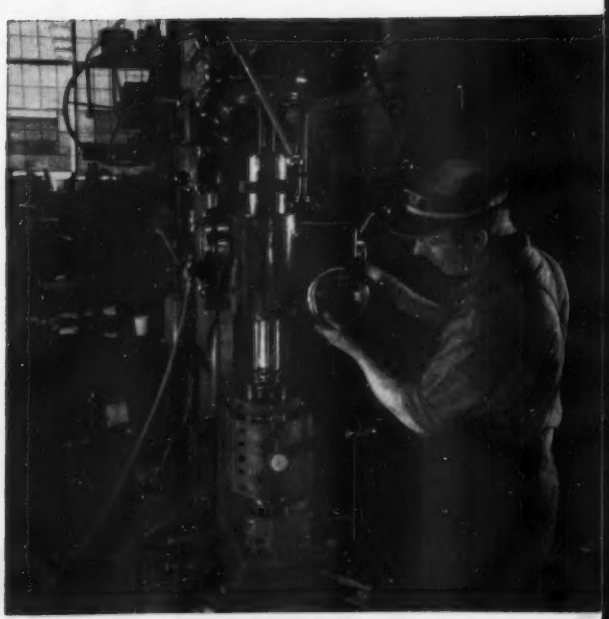
Call The Wesson man in your area. Ask him about the many Wesson Case Histories.

See "THIS CARBIDE AGE" educational color-sound movie on the history of carbide.

WESSON METAL CORPORATION

LEXINGTON 34, KENTUCKY

HOLES



costing too much?

NOT WITH CLEEREMAN

DRILLING MACHINES

Low cost holes require working drills at top efficiency. The built-in capacity and power of Cleereman Drilling Machines is greater than needed today with reserve for the tools of tomorrow.

- ✓ **Operate at maximum speeds**
- ✓ **Operate at maximum feeds**
- ✓ **Operate with maximum convenience**
- ✓ **Operate with minimum maintenance**

There is an enthusiastic user near you. Ask him about his hole cost. We will gladly furnish a list of installations.

BRYANT
Machinery & Engineering
Company
General Office
640 West Washington Blvd., Chicago 6
Representatives in Principal Cities

AFFILIATED WITH

CLEEREMAN MACHINE TOOL CO. Green Bay, Wisconsin

BUILDERS OF PRECISION JIG BORERS AND DRILLING MACHINES

For...

General-Purpose Sawing

with

High Speed

Accuracy, Economy

Model 4B/M2/E2
Equipped with standard
work track
(Optional Equipment).

Let us prove to you the many reasons why this MARVEL Hack Saw offers the cheapest, most accurate and fastest "cut-off" method available to you at a low initial cost.

Ask your dealer, or write us for Bulletin GP35 which fully describes and illustrates the many exclusive features which makes this Hack Saw Machine your "best buy".

MARVEL No. 4B
HIGH SPEED HACK SAW
Exclusive features

1. **Horizontal Ball Bearing Saw Frame.**
2. **Screw Feed—Automatic or Hand Operated.**
3. **Quick Return Stroke—allows greater number of strokes per minute.**
4. **Simple Positive Coolant System.**
5. **Adjustable Stroke—can be shortened for larger capacity.**
6. **Speed Range—available in 1, 2 or 4 speed models for wider range of work.**

Metal Cutting
MARVEL SAWS
Better Machines–Better Blades

ARMSTRONG-BLUM MFG. CO. • 5700 Bloomingdale Avenue • CHICAGO 39, ILL.

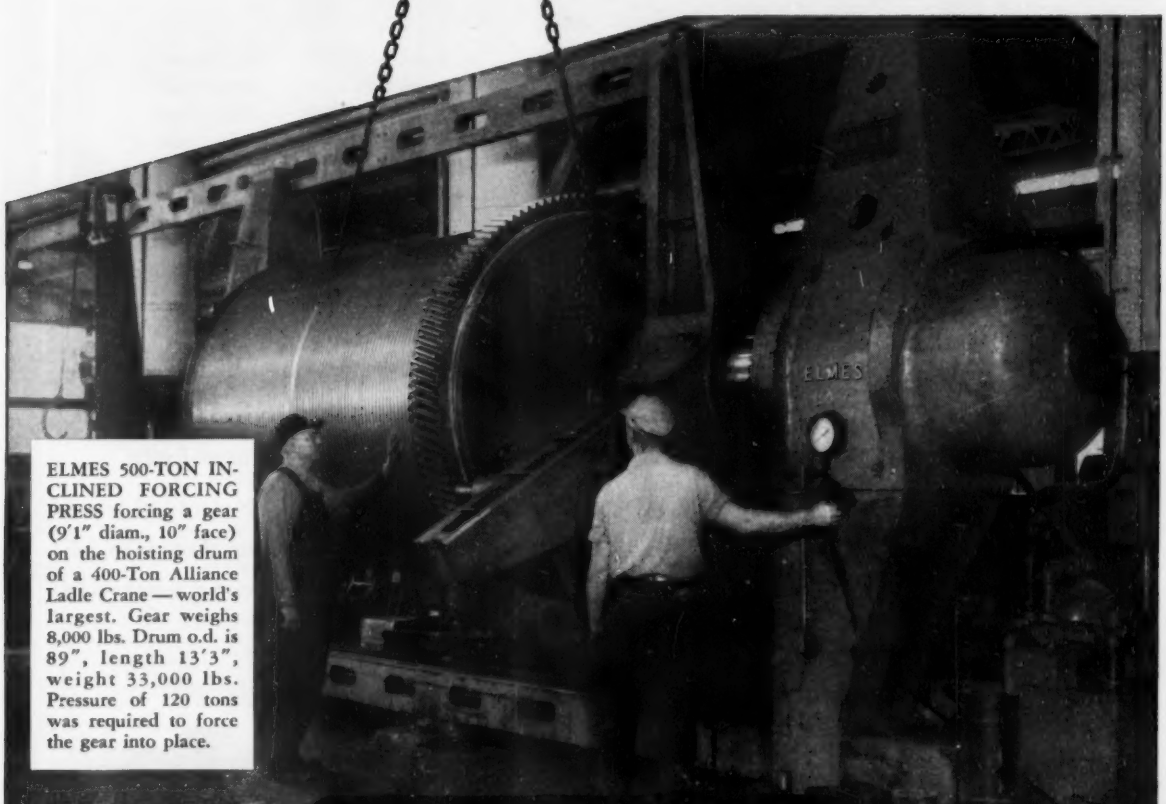
ELMES INCLINED FORCING PRESS
makes this tough job easy . . . and saves 50%!

Forcing the Gear on Hoisting Drum of World's Largest Ladle Crane at The Alliance Machine Company

The Alliance Machine Company, Alliance, Ohio, builder of the world's largest cranes, gives credit to the Elmes Inclined Forcing Press shown below for making possible a *50% saving* on gear installation costs.

By their performance, Elmes Inclined Forcing Presses have earned an outstanding reputation as sturdy tools of production. Built in capacities from 100 to 1000 tons, these rugged, dependable presses are ideal for forcing heavy wheels, gears and pulleys on and off shafts; for inserting and removing bushings; for many other uses in manufacturing and maintenance.

Is your plant doing jobs like these the hard way—the costly way? Why not look into the advantages of an Elmes Forcing Press? They make the tough jobs easy. Your Elmes Distributor can give you details. Write for Elmes Bulletin No. 1055-A. It illustrates and gives major specifications on the complete line of Elmes Hydraulic Forcing Presses . . . Horizontal, Vertical, and Inclined.



ELMES 500-TON INCLINED FORCING PRESS forcing a gear (9'1" diam., 10" face) on the hoisting drum of a 400-Ton Alliance Ladle Crane — world's largest. Gear weighs 8,000 lbs. Drum o.d. is 89", length 13'3", weight 33,000 lbs. Pressure of 120 tons was required to force the gear into place.

American Steel Foundries

ELMES ENGINEERING DIVISION

1141 TENNESSEE AVENUE — CINCINNATI 29, OHIO

DISTRIBUTORS IN PRINCIPAL INDUSTRIAL CENTERS — ALSO MANUFACTURED IN CANADA

METAL WORKING PRESSES • PLASTIC-MOLDING PRESSES • EXTRUSION PRESSES • PUMPS • ACCUMULATORS • VALVES • ACCESSORIES

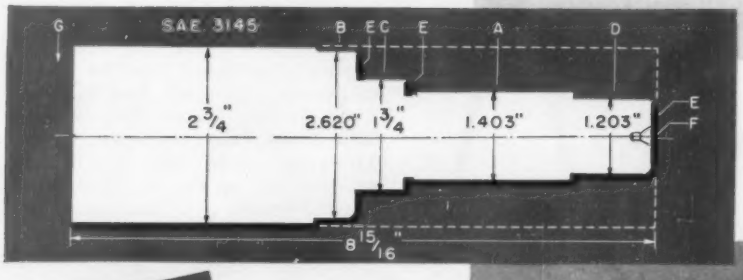
This is the difference High Velocity Turning makes

IN 1950 this job took...

12.40 min.

FLOOR TO FLOOR

A. Turn 489 RPM — .011 feed
B. Turn 340 RPM — .022 feed
C. Turn 489 RPM — .011 feed
D. Turn 489 RPM — .011 feed
E. Face end, shoulders & neck 489 RPM — .0055 feed
Chamfer
F. Center drill
G. Cut off 82 RPM — .0035 feed H.S.S.



IN 1954 this same job takes...

5.40 min.

FLOOR TO FLOOR

A. Turn 694 RPM — .022 feed
B. Turn 694 RPM — .022 feed
C. Turn 694 RPM — .022 feed
D. Turn 694 RPM — .022 feed
E. Face end, shoulders and neck — 694 RPM — .055 feed
Chamfer
F. Center drill
G. Cut off 489 RPM — .0025 feed

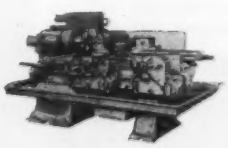
J & L TURRET LATHES GIVE...

MORE Ease of Operation
MORE Power Transmission
MORE Rigidity
MORE Accurate Stops
MORE Efficient Lubrication
MORE Coolant on Cutting Tools
MORE Accurate Results

Visitors who attend J &L's periodic "Production Studies" Seminars see this job turned out in just 5.40 min. on a Jones & Lamson #7A Universal Turret Lathe.

Only with lathes like this, built with plenty of power and the beef to back it up, can your shop take full advantage of the quality, productivity and lower costs offered by High Velocity Turning.

This job is one of the many turned at high speeds on our production line. Come to Springfield and see for yourself. At any rate, send for catalogs #101-A and #102.



JONES & LAMSON

Machine Tool Craftsmen Since 1835

JONES & LAMSON MACHINE CO., 502 Clinton St., Dept. 710, Springfield, Vt., U.S.A. J&L MACHINE TOOL DIV.

Takes on all comers!

This 42-72-84 Blanchard Surface Grinder is used for machining many sizes of torch cut steel plates. As the first operation after cutting, Blanchard grinding removes the proper depth of stock as required, frequently up to ⅛" per side, producing surfaces accurately flat and parallel for laying out or further machining. Work up to 7 feet across corners is regularly ground on this machine. In spite of its size, this grinder is as easily controlled as the smaller Blanchard grinders.

Typical of work produced is the 48" x 48" x 10" machine steel, die mounting plate, at left. 58 cu. in. of stock (.025" per side) is ground off in one hour and 35 minutes, floor to floor, with flatness held to .001". Note the magnetic hoist —a good tip for loading and unloading the Blanchard quickly.

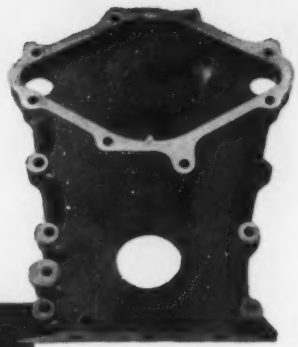
Regardless of your requirements for stock removal, tolerances or surface finish, Blanchard has the grinder and grinding wheel to do each job best.

Send for your free copies of "Work Done on the Blanchard," fourth edition, and "Art of Blanchard Surface Grinding."

PUT IT ON THE **BLANCHARD**

THE BLANCHARD MACHINE COMPANY **64 STATE ST., CAMBRIDGE 39, MASS., U.S.A.**

what's your time estimate on this job?



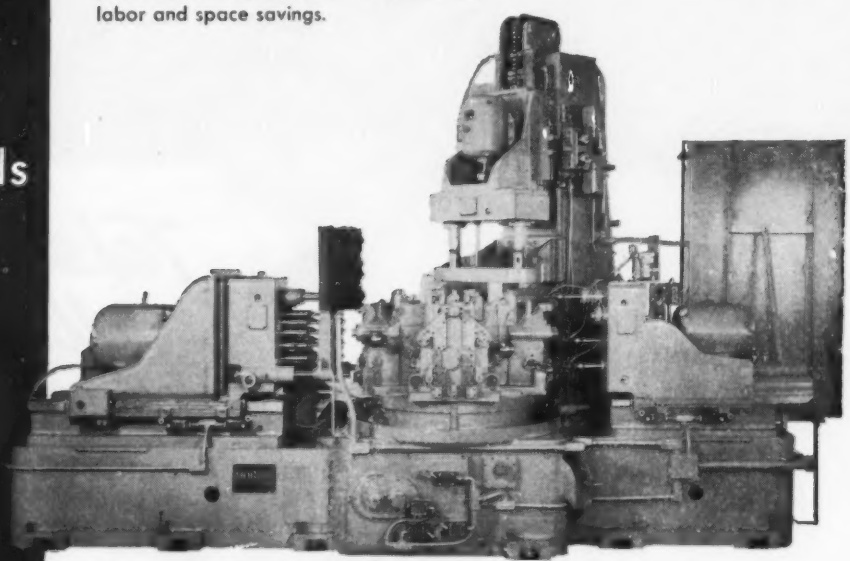
DRILL	19	HOLES
ROUGH BORE	2	HOLES
FINISH BORE	1	HOLE
CHAMFER	7	HOLES
REAM	1	HOLE
TAP	6	HOLES

Morris MOR-SPEED

Finishes One Part Every 33 Seconds

Machining a front cylinder cover for a popular make automobile engine, this four-way MORRIS Machine performs a two-cycle operation, and is production rated at 110 parts per hour at 100% efficiency. A total of 34 spindles do the operations listed above.

If your work requires numerous drilling, reaming, tapping and boring operations on a mass production basis, consult MORRIS Engineers. They will gladly show you case history proof of time, money, labor and space savings.



"A Better Product at Less Cost with PRECISION PLUS PRODUCTION."

Builders of MOR-SPEED Line

Morris

THE MORRIS MACHINE TOOL COMPANY
933 HARRIET STREET CINCINNATI 3, OHIO

more manufacturers are using SW-15 electrodes than ever before!

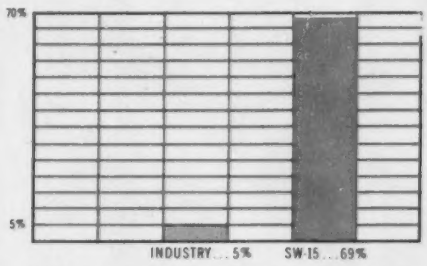
FASTEST GROWING ELECTRODE

The chart shows the increase, from 1950 through 1952, in shipments of electrodes. And the A. O. Smith SW-15 leads the industry's increase by 13.2 times!

more manufacturers are using SW-15 electrodes than ever before!

SW-15

the UNIVERSAL Electrode

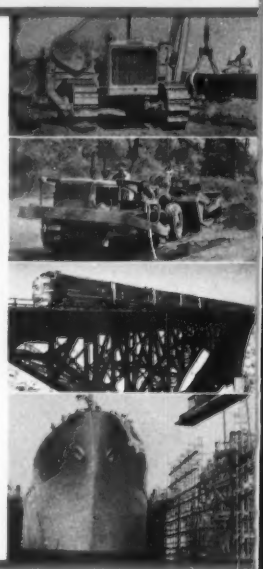


Here is the evidence of SW-15's growing acceptance among manufacturers who depend on welding in the fabrication of their products. SW-15 showed a 69% increase in acceptance and use, as compared with but 5% for all electrodes produced by the welding electrode industry from 1950 through 1952.

A few of the principal users of SW-15 are:

J. D. Adams
Allis-Chalmers
E. W. Bliss
Caterpillar
Chicago Bridge & Iron
Fruehauf Trailer
Graver Tank & Mfg. Co.
The Heil Company
Illinois Central Railroad
Ingersoll Rand
Iowa Iron & Steel
Kansas City Structural Steel
Link Belt Speeder
Omaha Steel
Pullman Standard Car
Santa Fe Railroad
Sheffield Steel
Trackson Company

Others are joining these every month to share the many benefits which the SW-15 electrode provides their welding operations.



SW-15 was developed as a universal type electrode which could be used for an extremely large number of welding applications. There is nothing else like it among mild steel welding electrodes!

It performed its first welding job in 1939, when it was taken into the field to weld refractory towers and sustaining structures usually welded with an E6010 electrode. It bettered the standard welding time by 50%! Its unusual ease of manipulation won over welding operators and management at once. New operators were readily trained with the SW-15. Its x-ray quality set new inspection records.

Two years later, SW-15 was welding on E6012 applications in the farm machinery and heavy road equipment fields. Excellent weld appearance, easy slag removal, little spatter, good bead with no undercut helped improve the products of these manufacturers.

Manufacturers found that due to SW-15's ease of manipulation, operators avoided slag inclusions, fish-eyes and voids, even in welds made in the field. This greatly improved the appearance of products it was used on and enhanced the reputation of the SW-15 electrode.

SW-15 is just one of the welding electrodes in the A. O. Smith line. There's an A. O. Smith electrode for every welding requirement:

MILD STEEL		HIGH TENSILE		LOW HYDROGEN		STAINLESS		STAINLESS	
AWS Class	A. O. Smith	AWS Class	A. O. Smith	AWS Class	A. O. Smith	AISI Class	A. O. Smith	AISI Class	A. O. Smith
E6010	SW-10	E7010	SW-75	E6016	SW-64	502	SW-151	310	SW-359
E6011	SW-14	E7010	SW-80	E6016	SW-65	505	SW-152	310	SW-169
E6012	SW-11	E7020	SW-76	E7016	SW-84	410	SW-153	310	SW-168
E6012	SW-17	E8013	SW-86	E8016	SW-81	430	SW-154	310	SW-368
E6013	SW-15	E9010	SW-95	E9016	SW-90	308	SW-162	316	SW-160
E6013	SW-16	E9013	SW-87	E9016	SW-89	308	SW-362	317	SW-161
E6020	SW-35	E10013	SW-88	E10016	SW-100	309	SW-166	318	SW-158
		E10020	SW-101	E12015	SW-120	309	SW-167	347	SW-157
				E12016	SW-103	310	SW-159	347	SW-357

THE ONE MILD STEEL ELECTRODE

no other can match!

...in ease of handling

SW-15 is easy for operators of varying skills to use in all positions. Its smoother arc, self-cleaning slag, lack of spatter and freedom from undercutting makes it easy for anyone to produce good looking, sound welds with the least effort!

...in quality of weldments

SW-15 welds have high-strength, high-yield, good ductility and consistent x-ray quality. This extends its use to welding low alloy, high tensile steels such as corten and manten, impossible for electrodes whose physicals can't compete with those found consistently in SW-15 welds.

...in appearance of welds

SW-15 bead appearance is excellent. Operators become more quality conscious, inclined to turn out better welding jobs when they can put in good looking welds so easily. Fine appearing welds aid in the ultimate sale of welded products, build acceptance not otherwise obtainable!

...in usefulness

SW-15 has an unparalleled history of success in many fields. Shipyards, during the war, cut their welding time as much as 50% by actual test and used millions of pounds of SW-15. Farm and construction equipment builders found its ease of application and high resistance to impact desirable, and became large users. Field erectors of vessels and structures adopted SW-15 after testing its speed, ease of application, and x-ray quality in weldments. Every year, more manufacturers turn to the SW-15 electrode to spur production and improve the quality of their welded products.

...in cutting costs

SW-15 is in a class by itself. Elimination of time-consuming slag removal, absence of spatter to be cleaned up, ease and speed of application by any operator, freedom from undercutting, excellent weld appearance that reduces inspection costs, and avoidance of weld repairs, all lower production costs directly. Then, the freedom from worry over possible field failures tops off these reasons for the tremendous use of SW-15 electrodes.

...in your plant

SW-15 has a use in your plant or shop. May we suggest that you write us or contact your local A. O. Smith Distributor for full details and a chance to test this remarkable mild steel electrode.

A.O. Smith way

A.O.Smith

CORPORATION

WELDING PRODUCTS DIVISION

Milwaukee 1, Wisconsin

INTERNATIONAL DIVISION: MILWAUKEE 1, WISCONSIN

A. O. Smith is your best single source for

A.C. AND D.C. WELDING MACHINES

with rated outputs from 180 to 1400 amps.

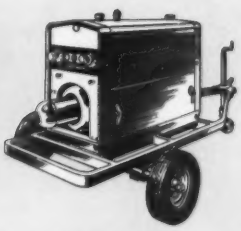
A.C. "CHAMPION"

A.C. "CHALLENGER"

A.C. "AUTOMATIC"

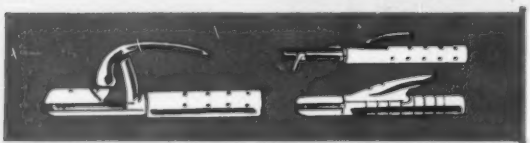
A.C. "UTILITY"

D.C. "RECTIFIER"



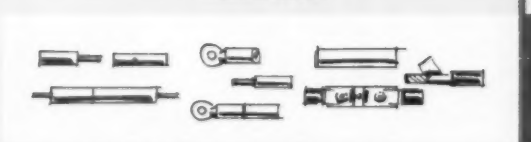
D.C. "FIELD KING"

WELDING SUPPLIES

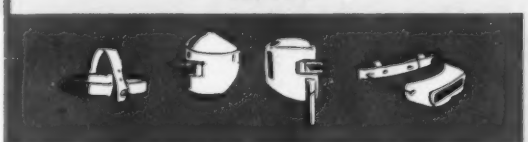


Electrode holders

Ground clamps



Cable, connectors, lugs, and splicers



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ACTUAL SIZE OF METAL STAMPING

Perhaps some of the formed metal parts produced in your plant could be handled to greater advantage in the U. S. Multi-Slide. Bulletin 15-A contains complete details, and your inquiries are invited.

The electrical part shown actual size at the left is produced from coil stock—complete, without further handling—at a speed of 140 per minute in the No. 28 U. S. Multi-Slide®. Another example of the advantages of the U. S. Multi-Slide for the precision fabrication of many types of metal parts calling for piercing . . . blanking . . . forming . . . swaging . . . embossing and similar operations!

The part illustrated is made of phosphor bronze .025" thick, and the sequence of operations is as follows: pierce 3 holes; trim top and bottom; shear on bottom; preform; cut off; finish form. The last operation is shown in detail in the profile view within the circle above.

In addition to eliminating costly secondary operations, U. S. Multi-Slides save manpower, too. A single operator can attend a battery of Multi-Slides, since the operation is entirely automatic. Operator merely loads coils of material onto a stock reel for feeding into the machine.

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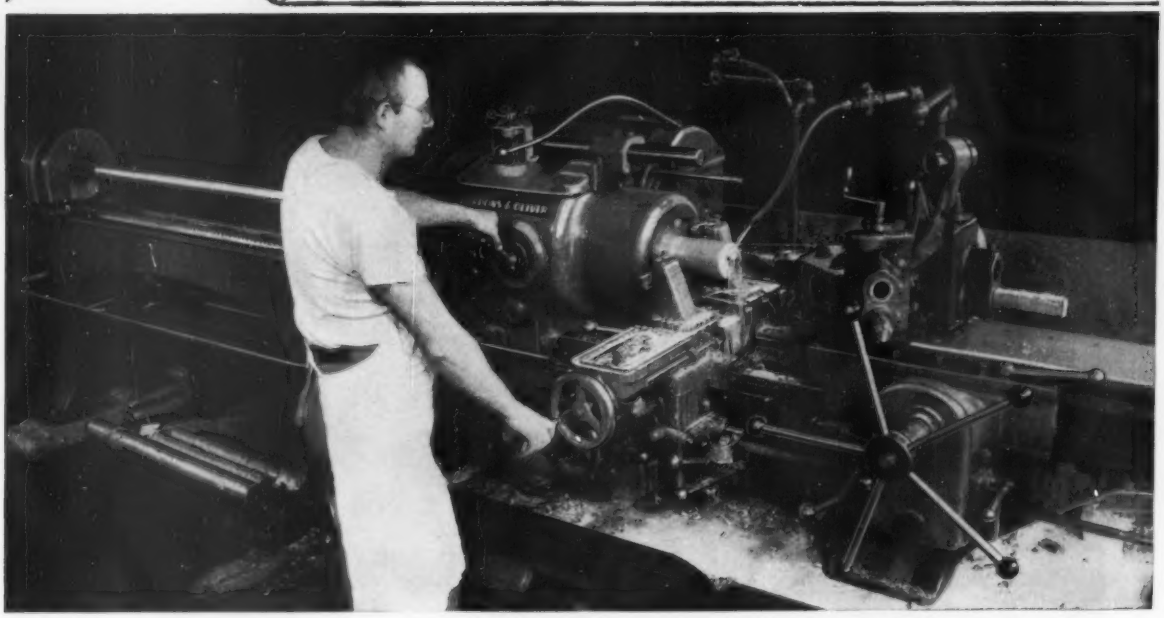

Mr. Albert Witt, Foreman of the Castings & Complicated Parts Department says: "The Bardons & Oliver Turret Lathe is performing beyond our expectations. We are now holding dimensional tolerances to within .002", well within the tolerance for machining parts of this size group. It is felt, however, that the machine is capable of producing parts within a tolerance of .001". With our new Bardons & Oliver Lathe we have found that we can greatly reduce machining cycles. With the extra attachment (Hydraulic Bar Feed) we have found it greatly diminishes the operator's effort, thereby reducing cost. We are using this machine for all of our large parts including the CinemaScope Lens Mount on which precision is required."

Mr. Witt's comments refer to the Bardons & Oliver No. 7—4½-inch collet capacity, Ram Type Turret Lathe.

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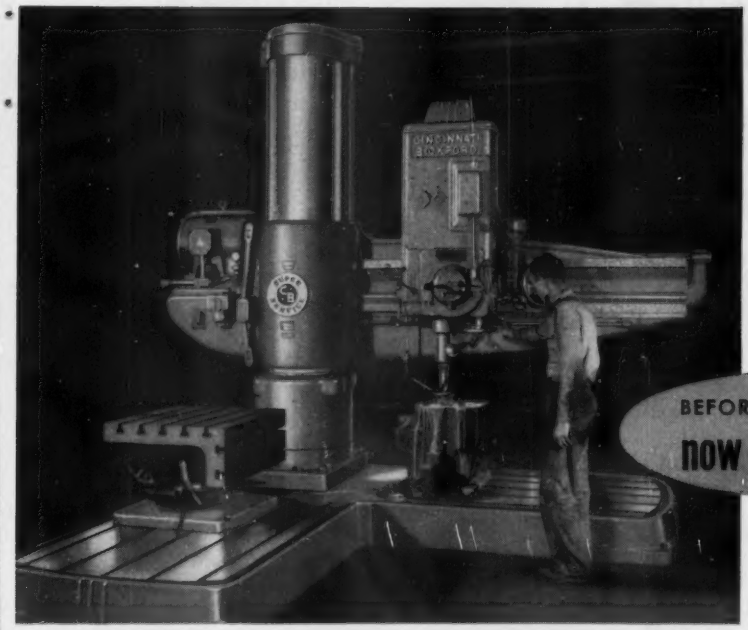

BEFORE 38 MINUTES
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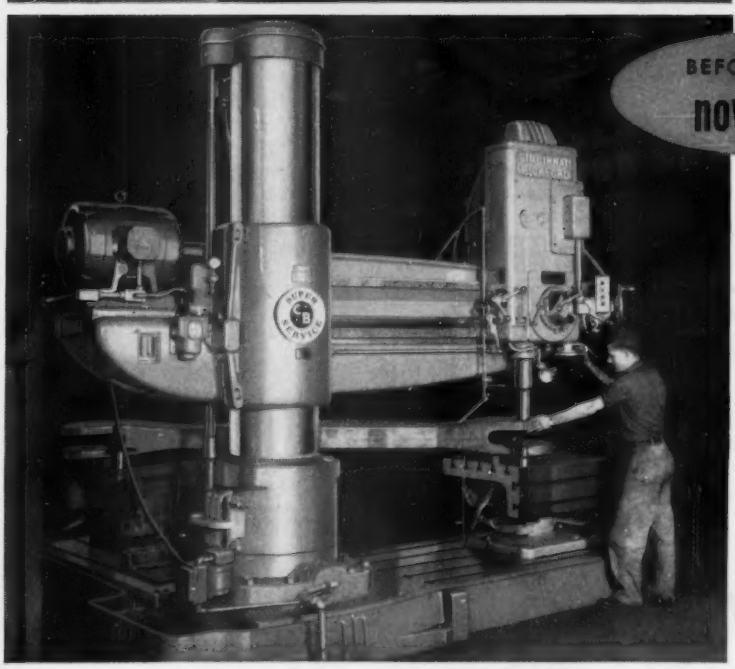

BEFORE 5 HOURS
now 3 hours

These two jobs are done with time savings at the Ohio Steel Foundry Company of Lima, Ohio.

The machine (upper illustration) is drilling breech rings for guns from 76MM to the 155MM size. In this tough material a 2½" diameter lead hole is drilled and opened up to a 3½" diameter with a core drill.

Machine, below, is drilling 3 5/16" lead holes in a 9-foot Ladle Vale. Holes are opened up with a single point boring tool. Time savings result from the outstanding ease of control, and the power and rigidity of Super Service Radial Drills.

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EXTRACTS FROM CURRENT LETTERS TO THE EDITORS

In France, We...

I read with considerable interest your article "Are Machine Tools Too Elaborate?" (*AM*—Aug 3, '53, p132) and was particularly amused by the paragraph, "Lathes could be built better but . . ."

I have been studying the building of economical machine tools for twenty years . . . turning out small, accurate lathes and boring machines . . . My plant seems to answer to the exact description given in your article. We employ 72 people and build 40 lathes and six boring machines per month. The whole business is based on teamwork . . . entirely trained in our shops . . . As an example, our machine beds are hand scraped with an accuracy that remains inside 0.0002 in. per 40 in. for parallelism . . . All-around quality of our materials can be compared with the best Swiss machines . . . We make only one type of machine with very modern production methods. We actually sell our 16-speed, 19 geared-head, 2.5-hp lathe, 12-in. swing, 28 in. between centers, with thread-cutting gear box, for under $1500. In my opinion, the individual machine-tool builder turns out too many types of machines . . . should specialize each plant in one definite type . . . easier to cut customer cost . . . enable small shops to have modern equipment . . . It is true that the price of labor in our country is lower.

M de Valliere
Boulogue Sur Seine
France

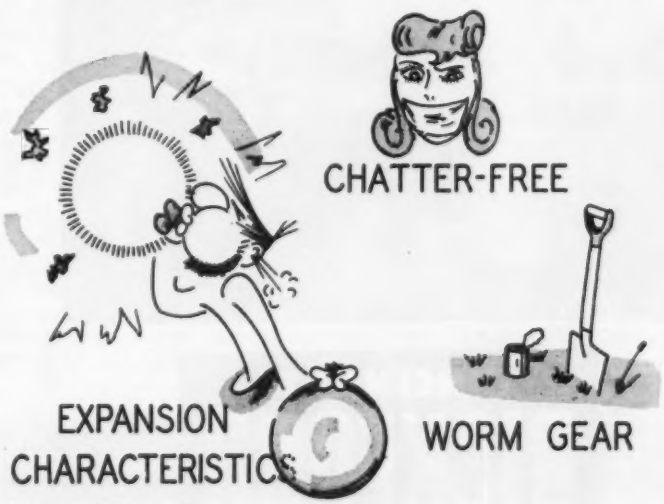
Corrective Interviews

It is unlikely that anyone will disagree with the writer of the article on this subject (*AM*—Nov 23 '53, p128). Any other approach is unfair, unwise, and may be so brutal that it fails in its purpose. I remember how an old works manager reproved a man who had scrapped a most important casting. The delay was of more consequence than the cash value, and an interested director sent word that the culprit should be given Hell.

The manager was much upset at the happening, but he knew the man was careful and conscientious and was enduring a hotter personal Hell than either a director or a devil could conceive. He went into the shop, as if on a routine visit and, accompanied by the foreman, worked his way toward the machine where the casting lay. The casting became

GRINETICS

By D G SMITH



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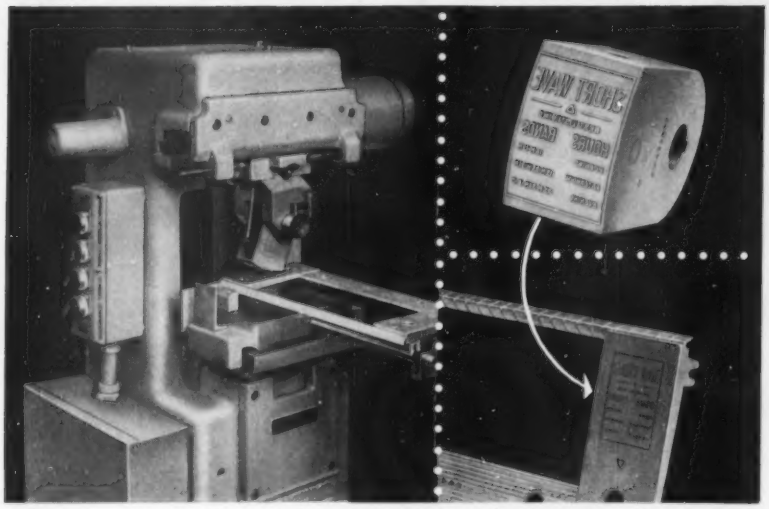
RECIPROMATIC

MULTIPLE PASS ROLL MARKING MACHINE



Noblewest's RECIPROMATIC Model 50P1 used for marking portable short wave radio panels with a sharp, permanent, extra-deep impression. Upper right shows Rocker Marker Die and marked panel below.

- ***For Extra Deep Marking***
- ***For Normal Depth Marking on Fragile Parts***

Another NOBLEWEST mark of achievement! This job required unusually deep marking on die cast parts which would have been fractured by marking the impression with straight pressure. But with the Noblewest *Reciprocatic*, a permanent, extra deep impression was *rolled* into the metal by several passes of the die . . . without distortion . . . or fracture.

Among the many features of this Reciprocatic ROLL-O-MARK all-pneumatic marking machine is a special control circuit which permits any number of roll marking passes to a given part . . . air-operated work table which provides uniform marking pressure and compensates for dimensional variations in piece parts.

Whatever your needs for metal marking, Noblewest makes the machines, tools and dies for doing the complete job faster, better, at lower cost. And remember, Noblewest Roll-Marking is *permanent* marking—*good for the life of your product.* There is a Noblewest representative near you. Write to Noble & Westbrook Manufacturing Company, 17 Westbrook Street, East Hartford 8, Connecticut.

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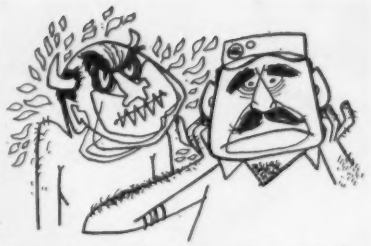

the subject of conversation and the manager explained how serious its loss was. Then he asked quietly how the error had been made. A reasonable explanation was given, accompanied by expressions of regret, and it was obvious that to have given the man a further roasting might well have turned a penitent into a don't-care rebel. On learning that the man's last scrap was made 18 months earlier, the manager remarked that it was a pity it had to happen on this particular job, but that it was clear from his record that it was hurting him more than any censure of his.

P E James
Lincoln, England

Stress and Deflection

I have been an avid reader of your magazine for many years, and always read Practical Ideas because they come directly from the men at the bench or machine. I admire the ingenuity of Mr Palmer (*AM*—Nov 9 '53, p166) in his attempt to solve the problem of the deflecting boring bar. However, a bar must obey Hooks Law that "Deformation or deflection is always directly proportional to the stress—up to the elastic limit."

Thus, prestressing will reduce the stress on a member when it is carrying the working load; it will not reduce the deflection. A load L will deflect a given bar a distance D; if we prestress the bar by applying a load $\frac{1}{2}L$, it will deflect (upward) a distance $\frac{1}{2}D$. When the full working load L is applied, the bar will still deflect the full distance D; that is $\frac{1}{2}D$ down to neutral, then the other $\frac{1}{2}D$ beyond neutral. The stress will be halved, but the deflection will be same, whether the bar is prestressed or not.

I have seen bars of all designs and materials but, as the modulus of elasticity of all steels lies between 28.6 and 30.3 million, the shape of the bar makes little difference. The best you can do is to use the largest bar possible, pilot it, or support it right in the work (*AM*—Oct 12 '53, p190). The other solution is a solid carbide bar. The modulus of elasticity of carbide is around 85 million, so such a

bar will deflect only one-third as much as a steel bar of the same diameter and under the same load.

Henry Gifford
Bronx, N Y

Would any of our other readers care to comment on this?—Ed.

Whoa—And College Degrees

Bob Newcomb's little dig at yours truly (*AM*—Jan 18 '54, p101) was so surprising that I wondered what I had really written to cause such an outburst. Rereading what I wrote on Cutting Oils and Chip Disposal still leaves me wondering. Surely Bob cannot think that us old-timers could handle present-day shop conditions efficiently, unless we had kept abreast of new development in tools, materials, cooling, and lubrication.

I do not see where I even suggested that a college degree was necessary for the foreman or even for the super. The good mechanic of today knows a lot more than we dreamed of about present-day shop materials, cutting oils, etc, without ever seeing a college. A college background might have helped both Bob and me, if we hadn't let it give us the idea that there was nothing more to learn. When I said "the machining of metals efficiently has become a real profession" I had no idea of suggesting that professors should run a lathe, or even be foremen. But what real research men have found out about cutting metals can help every man in the shop.

I take off my hat to men who have *earned* a good college degree. I'd have known more if I had been so fortunate. But I'm especially leary of men who boast of honorary degrees, although I have one myself. For I once worked for a man who had an honorary degree of doctor of engineering—and who couldn't find the oil holes in his new bicycle, or adjust the saddle. I'm sure a few minutes conversation with Bob Newcomb would convince him that I have no idea of requiring foremen to have a college degree. Fred H. Colvin

Point Pleasant, N J

ELIMINATE INSPECTION REJECTS
—CAUSED BY IMPROPER DRILLING

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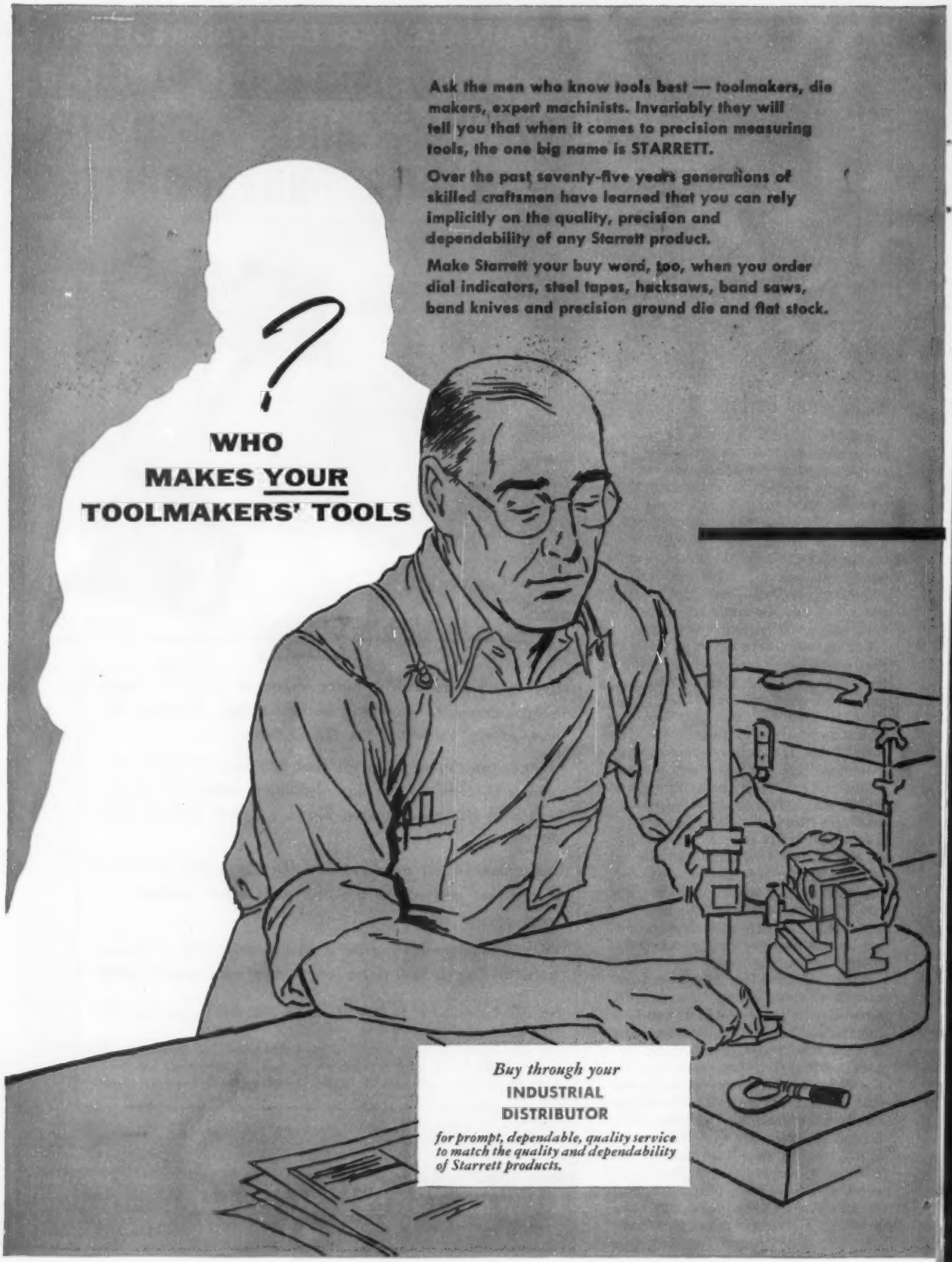
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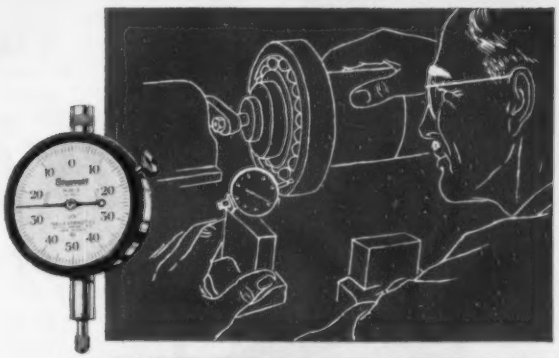

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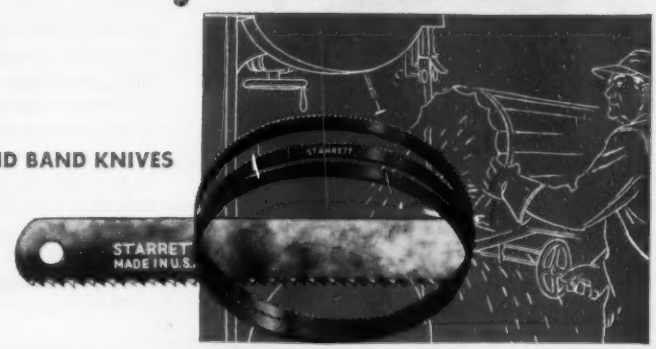

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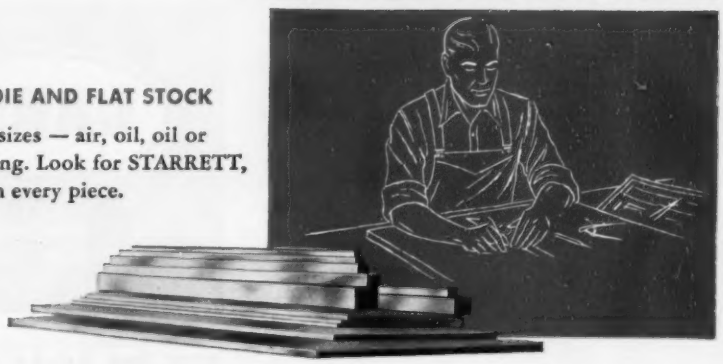

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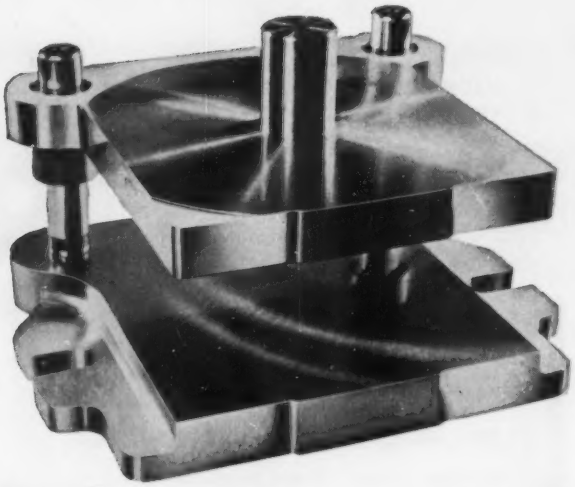

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at Eastman Kodak Company

Danly Die Sets play an important role in the manufacture of Eastman's popular new Brownie movie camera and Brownie movie projectors . . . latest in the Eastman line that Danly Die Sets have helped build all through the years. Used to mount high precision dies, Danly Die Sets help bring "master die" accuracy to every finished part. But Danly Die Sets do more . . . even before a press run ever starts. They make tooling-up easier, faster—save you many, many hours in the die shop. And once in production, these same Danly Die Sets do their share to maintain non-stop production . . . save down-time . . . increase die life. And remember, Danly Die Set service is as quick and convenient as a phone call.

DANLY MACHINE SPECIALTIES, INC.
2100 South Laramie Avenue, Chicago 50, Illinois

DANLY

DIE SETS . . . STANDARD OR SPECIAL
DIEMAKERS' SUPPLIES

PICK THE DANLY BRANCH NEAREST YOU!

***CHICAGO** 50	2100 S. Laramie Avenue
***CLEVELAND** 14	1550 East 33rd Street
***DAYTON** 7	3196 Delphos Avenue
***DETROIT** 16	1549 Temple Avenue
***GRAND RAPIDS**	113 Michigan Street, N.W.
INDIANAPOLIS 4	5 West 10th Street
***LONG ISLAND CITY**	47-28 37th Street
***LOS ANGELES** 54	Ducommun Metals & Supply Co., 4890 South Alameda
MILWAUKEE 2	111 E. Wisconsin Avenue
***PHILADELPHIA** 40	511 W. Courtland Street
***ROCHESTER** 6	33 Rutter Street

**Indicates complete stock.*

SPOT NEWS of Metalworking

- **Midwest machine tool builders' reaction to selling non-strategic tools to Russia** is being queried in telegrams sent them by the Chicago Council on Soviet-American Friendship. Note: all US machine tools are on the forbidden list for shipment to Russia.

- **British auto manufacturers are looking forward to a record year,** anticipating production of more than 850,000 cars and commercial vehicles. Record output for 1953 was 835,000 units. But cash volume will be smaller. Reason: volume demand is trending toward the highly competitive small car field.

- **Credit people think the domestic appliance industry hit its peak in 1953.** From now on, they say, it'll do well to stay anywhere near current levels.

- **West Germany has authorized purchase of more than $500,000 machine tools** from US builders, according to the West German Official Gazette.

Big push for the guaranteed annual wage won't come this year, labor experts think. But if the business downturn and consequent unemployment become serious, labor's rank and file will be ready by 1955 to pay the price of a long strike to win the guaranteed wage. Until they are, the unions won't go all-out in their demands.

- **Titanium sheet up to 48-in. wide, 144-in. long, as thin as 0.10 in.** is being produced at Mallory-Sharon Titanium Corp, Youngstown, Ohio.

- **Rust-preventive lead coating replaces moisture and air on steel surfaces,** eliminating principal cause of rust. Applicable to wet, brushed rusted surfaces, dry or light mill-scaled steel, compound can be dipped, sprayed or brushed.

- **England's David Brown plans to build a tractor plant in Argentina,** where initial demand is for 100,000 tractors: thereafter, 20,000 a year.

- **Toledo has more unemployed than Cincinnati, almost as many as Cleveland.** Its 16,000 jobless (total work force 188,000) puts Toledo on the critical labor surplus list. City officials are petitioning the government for some of the 20-30% of defense work it has set aside for distressed labor areas.

Six West German businessmen are said to have visited Moscow, strictly on their own hook and paying their own travel fares, in January. Result of the visit: Germany will get wheat and minerals from Russia in exchange for machinery and chemicals.

- **Japan's first independent quality standards inspection firm,** Japan Inspection Co, Ltd, Tokyo, has been set up by an ex-employee of a similar US organization to help establish manufacturing standards for Japanese export products.

- **Ironical situation in Detroit:** while the front pages of Detroit papers carry scare headlines on unemployment, want ad sections carry column after column of job openings for such skilled workers as machinists and tool and die makers.

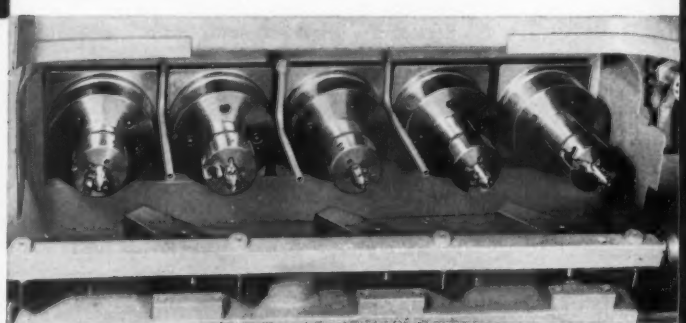
- **Here's how industrial distributors look at 1954:** out of 49 polled, 15 expected first half business to average 9% above 1953; 22 said it will be the same; and 12 said it will be 9.75% less. For the second half: of 48 polled, 17 expect volume to be up 9% over 1953; 19 say it will be the same; 12 say 6.9% less.

80 SURFACES IN 1 CYCLE

EX-CELL-O

MACHINE BORES, COUNTERBORES, FACES AND CHAMFERS 20 HOLES

This Ex-Cell-O Precision Boring Machine performs operations on 80 surfaces in one cycle on the projecting holes of a cotton picker bar assembly. Five spindles on the machine bridge are positioned to engage every fourth hole. The fixture indexes automatically between machining strokes to align the next set of holes with the boring bars.



The machine is a standard Style 112-C having a heavy well-ribbed base and table, long stroke; handles medium-sized and large work.

EX-CELL-O CORPORATION

DETROIT 32, MICHIGAN

Ex-Cell-O's line of standard Precision Boring Machines is exceptionally complete. Ask your local Ex-Cell-O representative about them, or write to Ex-Cell-O in Detroit for Catalog 31205.

MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING SPINDLES
CUTTING TOOLS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS
AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

53-37

Washington

Small Business Administration's lending program is perking up. During the past five months, the agency made 29 direct loans totalling $1.7 million and 37 bank participation loans worth $2.8 million.

That's just a start. SBA estimates that its total fiscal 1954 loans will add up to 350, totalling $17.5 million. For fiscal 1955, the agency expects to make 700 small business loans amounting to $35 million. Practically all SBA loans go to firms in defense or essential civilian industries. And the bulk of these have been granted to metalworking companies.

Close to 500 loan applications have been made to SBA's field offices. Last month alone, 185 small firms applied for business loans. By June, SBA expects the rate to run at about 300 applications monthly. From these figures, you can see that Washington is okaying less than 20% of the loan applications made. Average size of the loans approved is about $68,000. SBA is allowed to make small business loans up to $150,000. Only one direct loan that big has been made so far—to a chemical producer.

SBA warns Congress that the big headache for small business—and especially metalworking firms—is the "substantial drop in new military procurement and the flood of cancelled orders and contracts." The drop, says SBA, was "far steeper than anticipated." Since small business main role in defense procurement is in subcontracting, the small firms "suffer a disproportionate loss." SBA estimates that there are as many as 60,000 such subcontractors in the aircraft industry alone.

Another complaint of small contractors that SBA has brought to Congress' attention: Pentagon's new policy of restricting progress payments, which forces contractors to do their own financing for tooling and other expenses. SBA hints that the Pentagon policy "may affect the demand for SBA credit."

SBA is also concerned about the Pentagon's "increasing tendency to place contracts with big business." Here's the picture on this: between July 1950 and June 1951, prime contract awards to the top 100 companies amounted to 61.2% of total military procurement; by June 1952, the total rose to 62.4%; by June 1953, 64%. The increased concentration was mainly among the 10 largest companies, SBA says.

During the past five months, 173 prime contracts amounting to $16.3 million have been awarded to small firms under SBA's "Joint Determination Program." That's the scheme by which SBA field officers at military procurement installations needle procurement officers into earmarking specific portions of a big order to small firms. Minimum amount for purchases subject to this program is $25,000. SBA wants this lowered to $10,000.

• • •

The Air Research and Development Command is being revamped. With this soon will come a shift from Dayton to Baltimore (and eventually to Andrews Field, Md) for Air Force planning and procurement of weapons system development. The move signifies a switch in ARDC organization—centralizing authority in a "more industrial type of organization" with less military red tape. The revamping is aimed to meet specific industry gripes about former planning, development, and procurement methods.

• • •

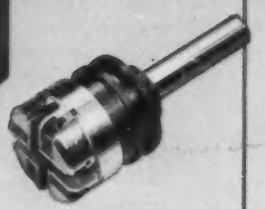
A showdown on tax relief for business and individuals is coming inside a month in Congress. Two major issues are up for decision: (1) leading Congressmen want more individual relief and reductions in excise levies; (2) the administration is still holding out for only a revision of the tax law to wipe out some corporate and individual inequities and to spur industry to continue to expand.

A knockdown fight could endanger some of the benefits businessmen have been expecting. Particularly the more liberal provisions for write-off of new plant and equipment (2/3 of cost in half the life of the item). So the administration is working to keep the legislation from being bogged down by too many amendments, from democrats as well as from Republicans.

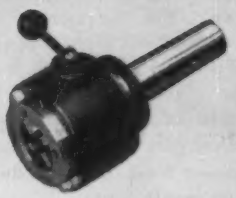
NEW DIRECTOR of the Metalworking Equipment Division, Business and Defense Services Administration, Ralph E Cross (right) is sworn into office by BDSA Administrator Charles F Honeywell. Director and executive vice president of the Cross Co, Detroit machine tool builders, Mr Cross is taking a leave of absence from his company for six months to serve BDSA without pay

Reduce THREAD COSTS and *Increase* THREAD QUALITY with MURCHEY TOOLS

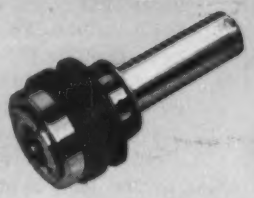
Precision-Pak with die heads and collapsible taps automatically taps holes up to 4" dia., cuts external threads up to 3½" dia.—also bores and reams. Lead accuracy assured by precision lead screw.



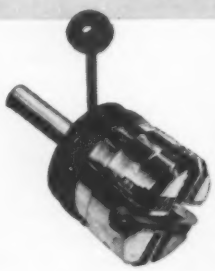
Rotating Die Heads, Type "ORB" with snap action trip and quick change radial type chasers, cut straight threads ⅛" to 5" dia.



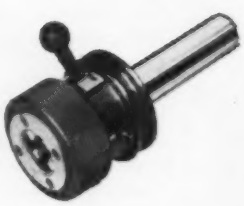
Non-rotating Die Heads, Type "OLB" with pull off snap trip and quick change radial type chasers, cut straight threads ⅛" to 5" dia.



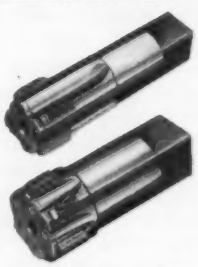
Rotating Die Heads, Type "TRB" with snap action trip and quick change Tangent chasers, cut straight threads ½" to 2" dia.



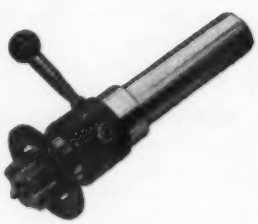
Non-rotating Tangent Die Heads, Type "TLC", with pull-off snap trip and quick change chasers, cut straight threads ⅜" to 2" dia.



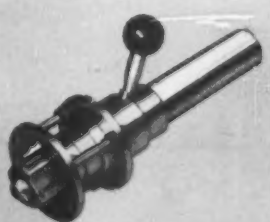
New 4 in 1 Type "ACB" Die Heads, Rotating and Non-Rotating feather action trip, cut straight threads ⅛" to 4" and tapered pipe threads ⅛" to 3½".



Solid Adjustable Taps "EHB" and "RHB" with removable chasers, cut threads 1¼" to 5" dia.—ideal for salvage work.

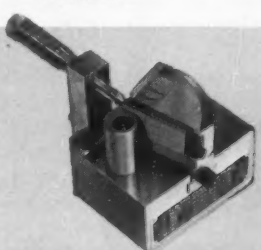


Standard Collapsible Machine Taps, Rotating or Non-Rotating, with easy size adjustment, cut straight threads 1¼" to 7" dia.



Semi-receding Pipe Taps, Rotating or Non-Rotating, with taper receding action, cut 1" to 6" taper pipe threads. May be arranged for straight threads also.

Type "L" Machine Taps, Rotating or Non-Rotating, with 18 interchangeable nose pieces and 2 bodies, cut a range of straight threads to 6¼" dia.



Tangent Chaser Micrometer Setting Fixture provides longer chaser life and better threads through more accuracy in setting chasers in their holding blocks.

Universal Chaser Grinding Fixture for use on either a surface or cutter grinder assures accuracy in grinding chasers of all types.

For more complete information on Sheffield-Murchey threading tools, get in touch with your local representative or write for Catalog MU-153.

Murchey Division, The Sheffield Corporation
Dayton 1, Ohio, U. S. A.

MASTER CRAFTSMAN SHEFFIELD HEADQUARTERS

SHEFFIELD

6548

Detroit

For years, Detroit's winter employment has been directly influenced by peace-to-war or war-to-peace conversion and, more recently, by auto industry cutbacks, made necessary because the public under ordinary circumstances perennially prefers to buy its new cars in the spring.

Large unemployment totals are a favorite publicity device of labor leaders and politicians: Merely by "viewing with alarm," they can be practically assured of newspaper space.

• • •

In the middle each time the front-page firing begins: jobless workers and the Michigan Employment Security Commission. The latter in February found the shots hitting too close, called in the press to explain how it gathers its employment data, emphasized that it is concerned only with getting jobs for the jobless and paying jobless benefits to those qualified.

It revealed that as of early February, state unemployment stood at 200,000, as against 176,000 in mid-January. Detroit metropolitan area unemployment was 121,000 or about 8% of the total work force. MESC expects that unemployment probably will remain there until May.

• • •

That was enough to classify Detroit as a "critical" or "distress" area, but the chances of getting a preferential push from the Defense Dept, which could give Detroit a favored position in awarding defense orders, were slight. Reason: There are no important orders to be placed that Detroit is qualified to handle. Even if there were, by the time tooling could be accomplished, the picture could be brighter.

One bright development: A multi-million dollar contract to produce additional airframe components for the B-57 was awarded to Hudson, whose peak employment of 15,500 in 1953 has dwindled to 7,500. The new contract is expected to sustain Hudson's employment into 1955.

• • •

Studebaker has scaled down its 1954 market aims. When its 1954 models were introduced, Paul Hoffman, board chairman, said the company was after 4½-5% of new car sales. C K Whittaker, sales vice president, said in Detroit recently that the company is now shooting for 4%. He didn't explain why Studebaker thinking has been revised.

• • •

The work of auto stylists and auto salesmen is irritating increasing numbers of engineers, many of whom believe that safety is being sacrificed in favor of fancier styling, higher horsepower.

In the matter of horsepower, engineers are not agreed as to its advantages and disadvantages. An engineer for a company which boasts one of the hottest power packages said that the "horsepower race has reached ridiculous heights."

Others say they expect to see one or more makes equipped with engines which develop 300 hp within five years or so.

The higher horsepower, say many engineers, is distinctly a sales department development: Company A goes out in front of Company B in horsepower; Company B's salesmen immediately demand that B's cars be upgraded as a talking point.

• • •

In styling, engineers are especially irked by car roofs which are becoming less sturdy, offering less and less protection to passengers. Whether the complaints will have any immediate or decided effect is anybody's guess. But if SAE's new president had his way, auto companies would reappraise their design thinking.

William Littlewood chided auto makers for giving so much attention to half-glass roof stylings and more powerful engines, and so little attention to safety measures.

• • •

A major auto marketing problem today is: when to introduce new models?

Companies which introduced early last fall got through the customary clean-up period, then just as they began new model sales drives, encountered clean-up discounting by competitive dealers whose new cars were not yet out.

Similarly, dealers whose factories introduced shortly after Christmas met rather stiff competition from Santa Claus. Some dealers believe a number of prospective customers who waited for all cars to be introduced lacked car money after paying holiday bills.

Companies likely will be drawing closer together this year, may bunch all introductions over a 6-8 week period—earlier than last year.

• • •

A couple of decades or so ago, auto companies agreed that advertisements boasting of top speeds of cars weren't smart public-relationswise.

Current ads suggest that the agreement has gone by the boards. Several companies are showing no reluctance to trumpet their high speed achievements. One executive, when asked why such claims were fashionable again, said his company was posting official marks merely to prove that competitors couldn't keep pace.

• • •

When Ordnance contracted with Chrysler to produce the Army's new T-51 tank retriever, it gave the company only eight months' lead time. That, said R T Keller, Chrysler vice president, is probably the shortest time ever allotted to put an Ordnance vehicle into peacetime production.

TO GEAR MANUFACTURERS *Exclusively*

if you have trouble meeting production schedules.

if you have trouble meeting precision tolerance specifications.

YOU should "read-up" on the HAMILTON® line of Small-Gear, Precision Hobbing Machines!

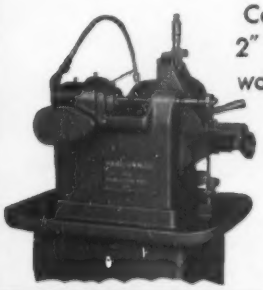
3

THREE *PRECISION* MACHINES to meet your every requirement.

HAMILTON No. 00

For the generation of spur gears and pinions only.

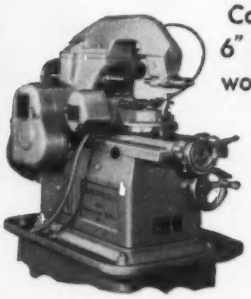
Capacity: 2" O.D. of workpiece.



HAMILTON No. 1

Hobs spur and spiral gears, worm gears and worms (to three thread), splined shafts, gear sectors, and pinions.

Capacity: 6" O.D. of workpiece.



HAMILTON No. 1-B

Generates any shape that can be made on the No. 00 or the No. 1 machines, *plus* bevel gears and face gears.

Capacity: 6" O.D. of workpiece (3" O.D. by 3/16" face, for bevel gears.)

Exclusive Greater range of hob spindle speeds: 109 to 1259 R.P.M. — 12 speeds.

Exclusive Speed, feed, indexing. *Each can be selected independently.* This, and wide range of hob speeds, adds flexibility; reduces set-up time; gives quick selection of speed and feed to suit material and gear size.

Exclusive Alignment and trueness of work and hob spindles are held to within .0002".

Exclusive Generates gears from 3 teeth to 1200 teeth.

Exclusive Accumulative error of not more than .0002"

THE COMPLETE STORY will be sent to you free for the asking. Request BULLETIN GH-5310 DO IT NOW!

THE *Hamilton* TOOL COMPANY

830 S. NINTH STREET • HAMILTON • OHIO • U • S • A

Machine Tools

The British machine tool industry will be meagerly represented at the Fourth European Machine Tool Show at Milan, Italy, next September. This news from London is surprising, in view of the fact that the British recently joined the European Committee in an official capacity.

Some of the British appear disturbed over the lack of interest in the Milan show, which will be the last European exhibition on a grand scale until 1957. The British International Machine Tool Show at Olympia, London, held every four years, is scheduled for 1956.

• • •

US production equipment makers are taking action to protect their interests in Europe. One company is reported to have completed arrangements to have its machines built in England. In addition, Cone Automatic Machine Co announced recently the formation of a British subsidiary to engineer and sell Cone automatics to be made by Churchill-Redmond.

A third US company is said to be negotiating to have its machine tools produced in France.

Still another American builder is looking into the possibilities of having its machines manufactured in France, Germany and Brazil.

• • •

Several companies have investigated carefully the pros and cons of setting up their own production facilities in Europe or of licensing European builders to make their machines, but have abandoned both ideas in favor of trying to sell through long-established foreign agents the machines built here at home.

At least two builders have strengthened their sales staffs in western Europe and feel that they have profited thereby.

US builders establishing British companies seem to feel that the British market is the biggest source of export business and that they can sell more advantageously on the Continent from England than from this country.

• • •

Meanwhile, as Americans eye foreign markets, new arrangements are being made to place European machines on the American market.

Announcement already has been made that the Pilote automatic lathe, product of H Ernault Batignolle of Paris, is to be built in this country by the Industrial Metal Products Corp of Lansing, Mich, and sold by HEB Machines Inc of New York.

Now comes word that National Acme Co of Cleveland is to be the sole distributing agent in this country for BSA single-spindle automatics made at Birmingham, England.

A group of British machine-tool builders is about to leave for Moscow, or is already there.

It is led by Sir Greville S Maginess and is comprised of members of the Associated British Tool Makers Ltd.

These firms are represented on the mission to Moscow: Churchill Machine Tool Co, Kendall & Gent, George Richards & Co, Butler Machine Tool Co, H W Ward & Co, John Lang & Sons.

Report from Britain says that some of the members have been to Moscow before and dealing with the Russians will be nothing new to them.

Assumption is that the British government has given the green light to the builders to take Soviet orders. Virtually no British machine tools were shipped to Russia in '53.

Robert Asquith of Asquith Machine Tool Co is said to have booked $1.96-million for sale to Russia. But, he thinks, "a large proportion will be subject to embargo" and he won't be able to fill that part of the order.

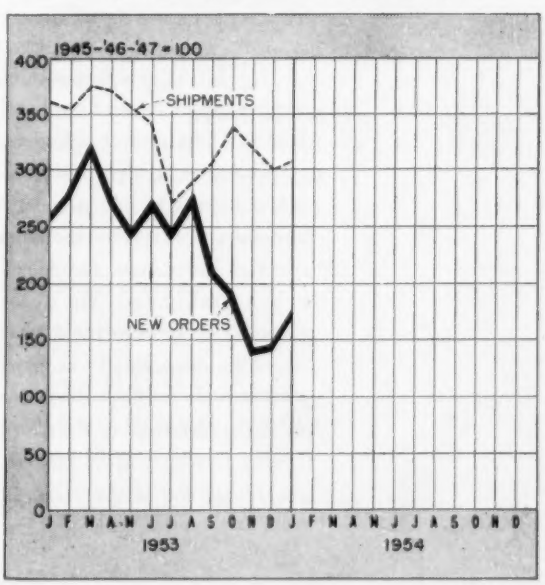
And a British woodworking tool manufacturer has booked $6.3 million in Russian orders, representing 35% of his next 3 years' output.

BF

MACHINE TOOL INDEX

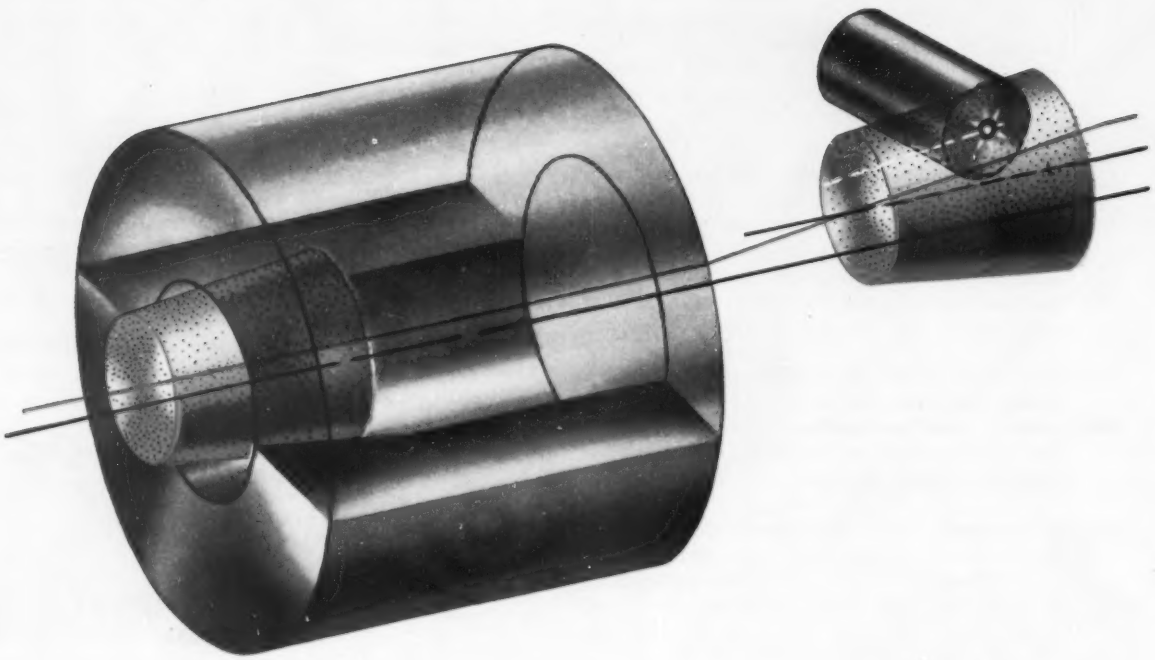
(1945-47 = 100)

(Source: National Machine Tool Builders' Assn.)



alignment

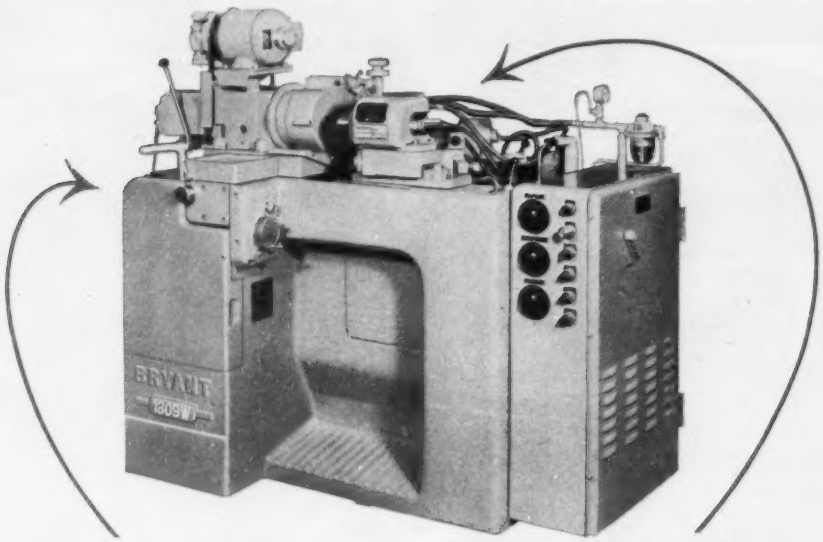
for better internal grinding



IT is common assumption in internal grinding that once the grinding wheel passes the diamond, all errors will be eliminated and the wheel will be a perfect cylinder. It is also assumed that this grinding wheel can produce a straight hole. These two assumptions are true if the wheel path is a straight line parallel with the axis of the wheel as it passes the diamond and traverses the work.

In the illustration, the wheel slides are badly worn and the wheel path is not a straight line. The distortion in the ways causes the wheel to move gradually away from the diamond and the wheel is dressed to a taper as it passes the diamond. Then, as the tapered wheel traverses the work, it will grind only on its large diameter. At the point of reversal the tapered form will be transferred to the work. If the traverse stroke is lengthened, the tapered section will be moved to the new point of reversal. In addition, wheel wear will be excessive, finish will be poor, feed lines may be visible.

Available information advises simply turning the workhead or changing the length of traverse to correct taper. In the case illustrated, neither turning the workhead nor changing the length of traverse will produce a straight hole. The only possible remedy is to straighten the wheel slide ways which will, in turn, straighten the wheel path. The wheel will then contact the work properly, producing correct geometry of the hole, longer wheel life and better finish.



Left end of workhead may be raised or lowered to bring its axis into a plane parallel with the wheel path.

Rear of wheelslide may be adjusted to insure straight line motion of the wheel.

The No. 1309-W internal grinder is for precision, production grinding of two bores and a taper at one chucking where size, concentricity and surface finish are of utmost importance. Although intended primarily for bore diameters from 1/16" to 1/2", it has a chuck swing of 9" and a maximum grinding stroke of 3 1/2". Two wheelheads are used and the work is indexed from one to the other. The wheelheads are mounted on an auxiliary angular slide for traverse grinding the taper. Preloaded ball slides on both the longitudinal and cross slides and the auxiliary angular slide assure the sensitive control necessary for grinding small bores to close tolerances. Write for folder.

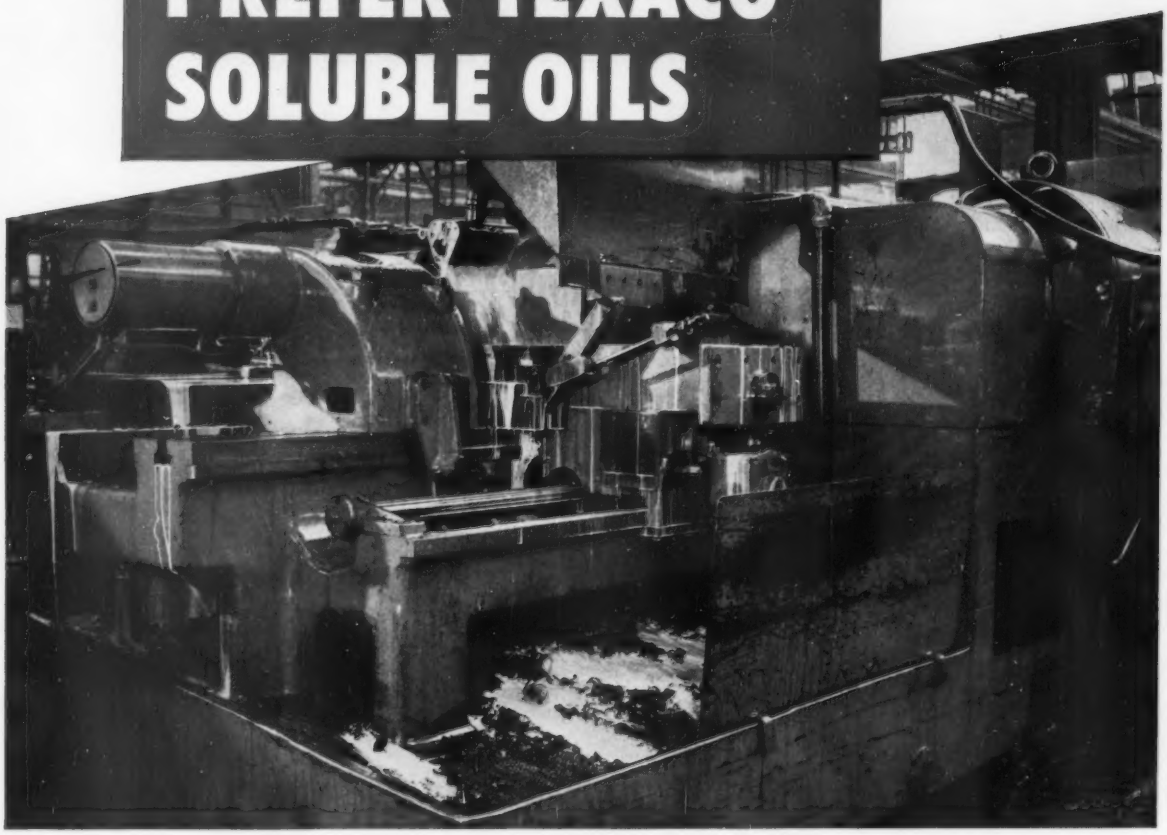
Write for "Alignment" booklet which gives complete details on this interesting subject. Also ask for booking form on new sound, color movie — free showings arranged for engineering groups.

Bryant Chucking Grinder Co.

Springfield, Vermont, U. S. A.

Internal Grinders • Boring Machines • Internal & External Thread Gages • Granite Surface Plates

WHY OPERATORS PREFER TEXACO SOLUBLE OILS



PROOF OF PERFORMANCE is the best way to point up the outstanding advantages of *Texaco Soluble Oils*. The following examples are drawn from actual case histories (names on request):

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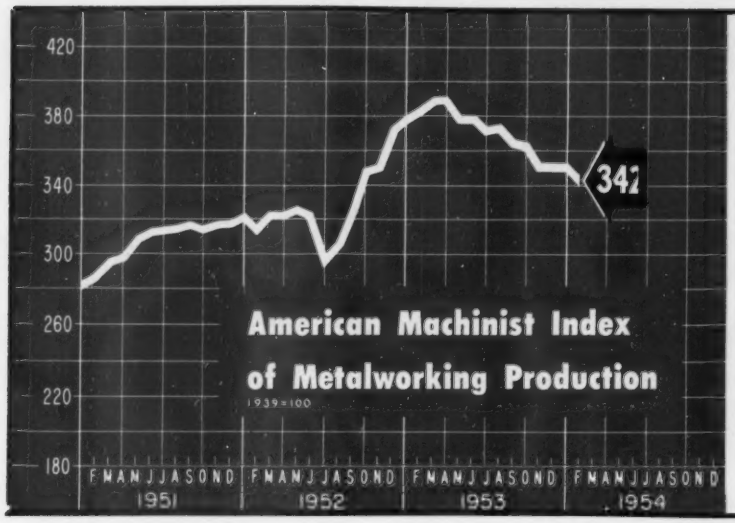
Gaging Metalworking



PRODUCTION INDEX

BASED ON MANHOURS WORKED IN THE FIVE COMPONENTS

	FEB '54(*)	JAN '54(p)	DEC '53(r)	JAN '53
Tot. Index..	**342**	**342**	**352**	**368**
Machinery	**308**	**316**	**338**	
Electrical Machinery	**367**	**392**	**410**	
Autos	**273**	**284**	**294**	
Other Transportation	**594**	**592**	**602**	
Other Metalworking	**336**	**342**	**357**	

(*) Estimated (p) preliminary (r) revised

Metalworking operations in February are estimated to have sagged a bit under the January level.

The dip in production can be charged to inventory adjustments that many manufacturers are making. There is a general tendency to eliminate overtime. More than that, some companies are down to four days a week.

Automobile makers provide the most spectacular example of cutting production rates to fit the retail demand for cars.

• • •

There is no rush to place orders for industrial machinery. Buyers are cautious and are inclined to hold off to get a better idea of what's ahead.

Production of capital goods nevertheless is being "sustained" on a high plateau. Backlogs are being sliced, however, as output far outstrips sales in many lines.

• • •

Many steel users have been living mostly on inventories for many weeks. In fact, the desire to pare stocks of steel first became evident last fall and has continued through the winter.

An upturn in orders reported by some steel mills is the first indication that inventories in customers' hands may be getting down to "normal."

Steel makers are augmenting their sales by taking small orders for quick delivery. Not long ago this type of business went exclusively to warehouses.

• • •

Stamping shops have 12-20 weeks of work. They have been cutting down on shifts, or the pile-up of orders would be slimmer than it is. Defense ratio to total stamping production is half what it was a year ago. It is expected to decline even farther.

• • •

Screw machine products people are worse off than the stamping plants. Business this year will be off 30%. At least half the loss will come from customers who are filling their needs from their own captive shops.

Commercial tool and die shops report incoming business running under last year's volume.

Employment is off slightly and represents a weeding out of the less efficient. Jobs are still available for skilled tool and die makers.

Amount of work on hand dropped 35% the past year. Despite the slackening in orders and backlog, the number of hours worked in tool and die shops has stayed high.

• • •

The New Orders Index of industrial machinery and supplies has gone down for four consecutive months and now is at the lowest point since August 1952.

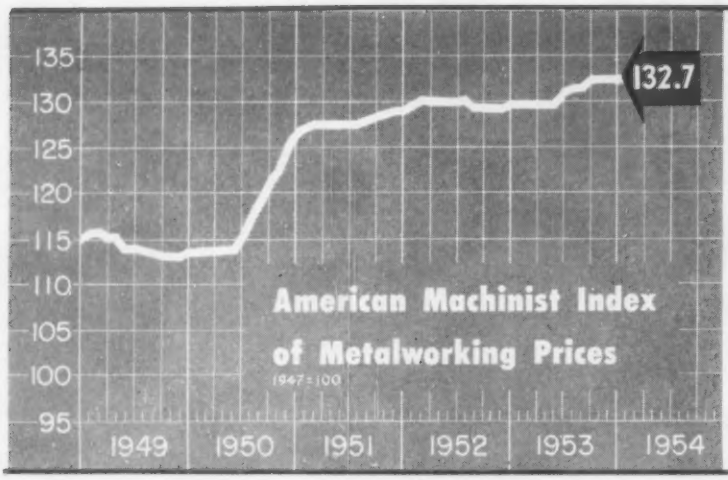
• • •

Home appliance sales this year should be almost equal to the 1953 total of $5 billion. TV and radio accounted for about half of the total last year.

Here is what a rundown of the outlook shows: 3.5-million refrigerators should be sold in '54, compared with 3.7 million last year. 1.2-million electric ranges, same as last year, will be sold.

Home freezer sales too (1.2 million) will match the 1953 figure. Air-conditioning units will command the most active market of all. Sales last year touched 1 million units, or three times 1952 sales. Prediction for 1954: 1.5 million units.

Gaging Business



PRICE INDEX

	FEB '54(*)	JAN '54(p)	DEC '53(r)	JAN '53
Total Index	**132.7**	**132.7**	**132.6**	**129.7**
Metalworking Machinery	**141.8**	**141.8**		**137.8**
Other Machinery exc. Electrical	**137.3**	**137.4**		**132.4**
Electrical Machinery	**132.0**	**132.0**		**124.5**
Fabricated Metal Products	**129.1**	**128.9**		**128.3**

(*) Estimated (p) preliminary (r) revised

Non-farm employment dropped 2 million between December 1953 and January 1954.

Seasonal factors had a lot to do with it. But in manufacturing the over-the-month drop was larger than usual. And the nation's over-all economy hasn't quite the zip it has had for the past few years.

• • •

But this was the second largest January on the books for non-farm employment — 47.7 million — exceeded only by January 1953.

And non-manufacturing employment set an all-time January record.

• • •

The factory workweek dropped under 40 hours in January — lowest number of hours worked in any month since November 1949, and 1.6 hours under January 1953, the postwar peak. Reason: less overtime.

All but four of 21 reporting industries indicate declines in the factory workweek. Greatest cutbacks were reported in fabricated metals, instruments, machinery and textiles.

• • •

Gross hourly earnings are at an all-time high of $1.80. And over the year, hourly pay was up 6 cents, with largest gains reported in transportation equipment, food, tobacco, chemicals, printing and ceramics.

• • •

December inventories were just under $80 billion — about $200 billion under November after seasonal adjustments. Retailers' inventories increased $200 million, manufacturers' and wholesalers' each declined that amount.

At the beginning of the year, inventories equalled about 1.7 months.

• • •

January retail sales were off 1% from December and 3% off from January 1953. But furniture and appliance, lumber and hardware dealers reported increased sales.

WEEKLY BUSINESS INDICATORS

	Latest Week	Preceding Week	Year Ago
Business Week Index of Activity (1947-49 = 100)*	124.1	124.6	135.0
Steel ingot operation (thousands of tons)	1,764	1,774	2,248
Electric power output (million Kilowatt hours)	8,674	8,855	8,129
Production of automobiles and trucks	138,378	143,654	146,809
Engineering construction awards (*Eng. News-Record* — millions)	$196.9	$194.3	$267.8

MONTHLY BUSINESS INDICATORS

	Latest Month	Preceding Month	Year Ago
Index of industrial production (1947-49 = 100)*	125	127	134
Index of durable manufactures production (1947-49 = 100)*	140	143	154
Durable goods manufacturers' sales, millions*	$11,567	$11,867	$12,536
Electrical machinery manufacturers' sales, millions*	$ 1,350	$ 1,324	$ 1,374
Other machinery manufacturers' sales, millions*	$ 1,840	$ 2,068	$ 2,122
Durable goods manufacturers' new orders, millions	$ 9,543	$ 9,631	$12,732
Electrical machinery manufacturers' new orders, millions	$ 975	$ 886	$ 1,522
General machinery manufacturers' new orders, millions	$ 1,792	$ 1,800	$ 1,878

* Seasonally adjusted

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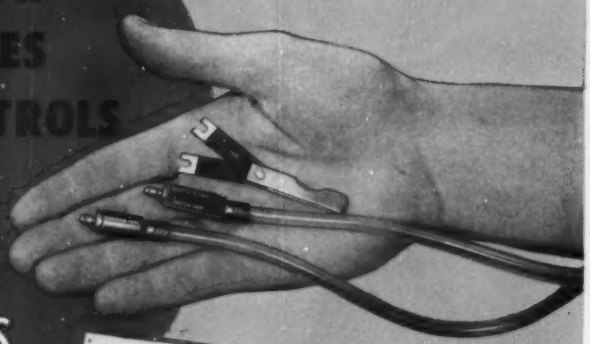

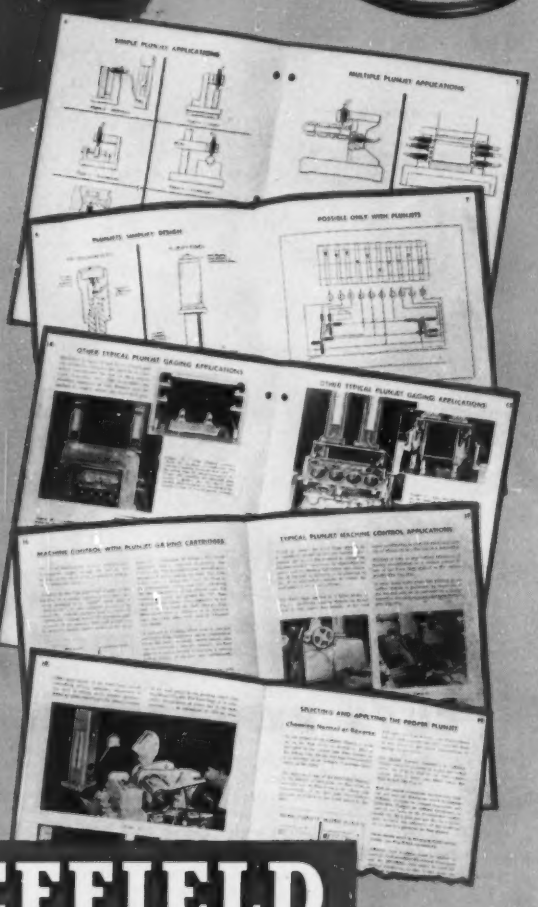

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American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

The Soviet Challenge in Productivity

You have had the word "productivity" drummed into you so persistently and incessantly that you probably are sick of it.

But you have not heard it more frequently than the Russians. Productivity is a sort of fetish, or perhaps even an obsession, with them.

Keen students of Russian ways report that Russia, almost since the early days of the revolution, has been absorbed in the problem of increasing productivity. The measure of productivity — the hourly output of the individual worker — is regarded as the Soviet's "most important national economic index."

Even Lenin himself stressed the critical role of productivity in the growth of the collectivist system. "In the last analysis," he said, "productivity of labor is the most important, the principal thing, for the victory of the new social system."

No one outside the charmed circle within the Kremlin knows exactly what is happening to Russia's productivity. Those in America who make it a business to study Russia are convinced that the performance has been disappointing to the Soviet's masters. There has been some improvement, but not nearly enough.

America meanwhile has not been standing still. You may be surprised to learn that productivity in our country has been rising lately at an unprecedented rate.

It went up only a meager 1% a year, if at all, during the long war and immediate postwar period from 1939 to 1947. That was only about one-third the historic average dating back to the beginning of the century. Since 1947, however, productivity has steadily gone up 4% a year.

These sensational gains in productivity can be traced to many factors: Our inventiveness as a people, our technical aptitude and knowledge, our readiness to mechanize on the slightest provocation, our growing investment per worker in new plant and equipment, the general absence of fear of technical displacement by the worker.

Whatever the reasons may be for this remarkable record, it is in the national interest, and in your selfish interest, to see that there is no slackening in the continuing upward movement of productivity.

Russia still has gains in productivity as a prime objective. Her strained efforts to increase her own output of industrial machinery, including machine tools, are proof of that fact. Her eagerness to purchase machinery outside the Soviet sphere is added evidence of her desire to mechanize as fast as possible.

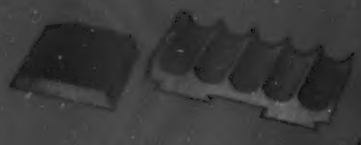
Russia's actions, as well as the rapidly developing competitive situation here, should spur America's metalworking manufacturers to try to keep the productivity curve slanting upward as steeply as possible.

Remember this: As long as we can maintain an industrial machine much larger and more powerful and more efficient than Russia's, the chances of war are minimized.

What Russia fears most, even more than atomic weapons, is our astonishing capacity to produce. Our prodigious pouring out of war goods helped her win in World War II and brought total victory to us. The Kremlin is not sure that we cannot pour out war goods again, should the need arise.

No wonder Russia keeps her eye on the productivity curve! We should do the same thing, because we have even more at stake than she does. That curve will tell us conclusively what is happening to our standard of living and how much margin we have in our national security. For the sake of all of us, industry must be sure that productivity continues to go up rapidly.

Burnham Finney

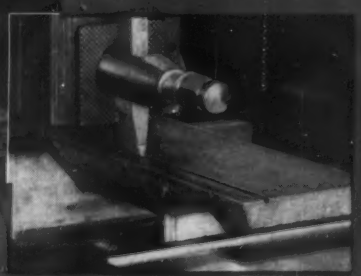


Form Tools

Dies from Templates

Facing 90° shoulders

Duplicating a Cam



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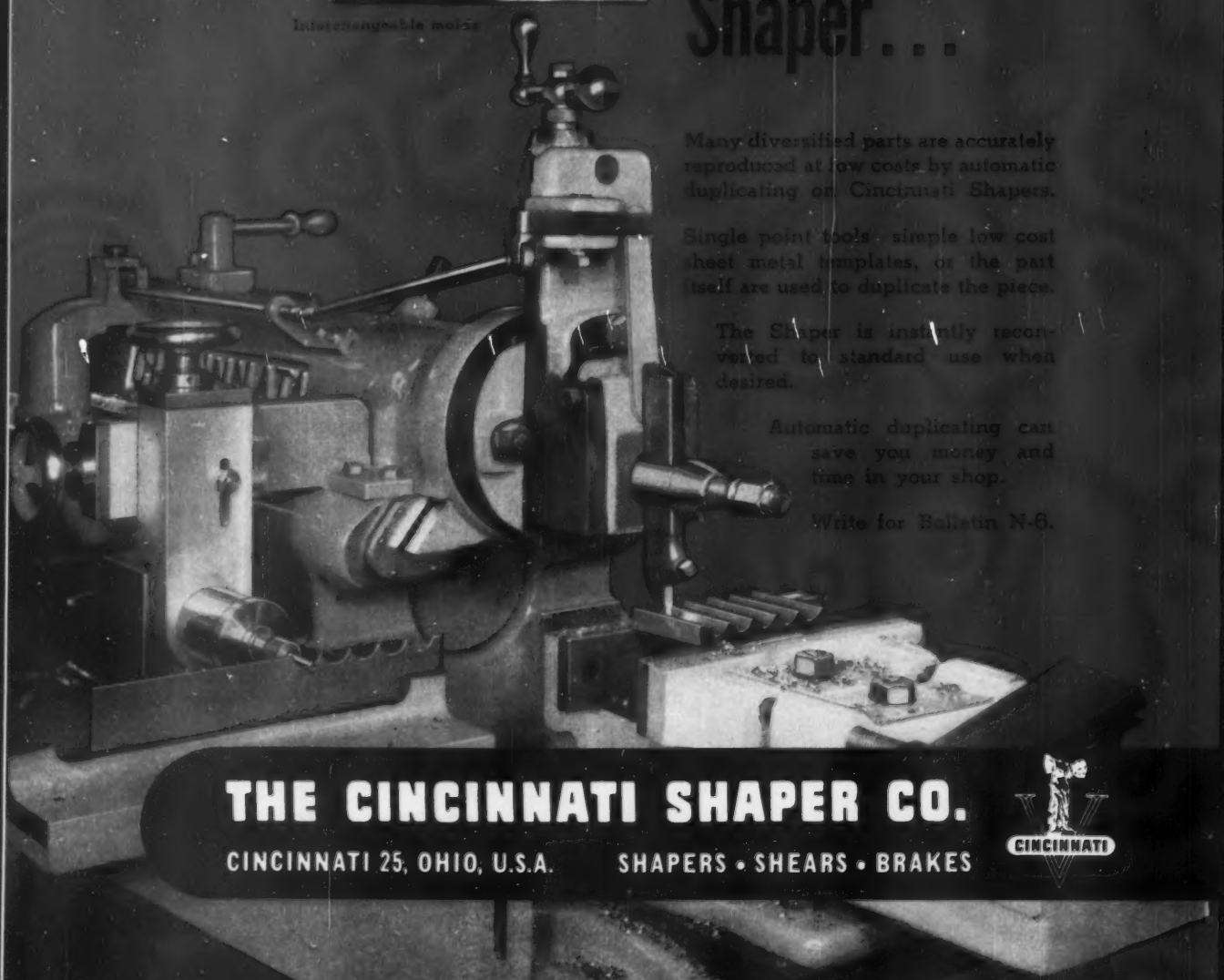

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a new look at...

CUTTING FLUIDS

Recently developed products make selection of cutting fluids somewhat more complex, but the result is a fluid to fit the job, rather than a job to fit the fluid

HARRY N LEAVE, New Methods Development Manager, VAN STRAATEN CHEMICAL CO, CHICAGO

Many plants are losing money because they try to fit the machining speed, feed, and tool design on all machines to the ability of a single cutting fluid.

They reason: "Aren't all oils the same? We can't have a different cutting fluid for every machine!"

Today, tool designers and process engineers can set up a machining operation the way they would actually like to see it run, without making sacrifices to allow for limitations of the coolant.

This does not mean that every machine in a plant will end up with a different tool lubricant. Selection will be based primarily on two factors—metal structure and machining speed, and, because most plants are divided into departments, handling largely the same kind of work, it will generally be true that cutting fluids will be based on departmental, rather than individual, operating needs. The same factors which require the use of different grades of carbides and grinding wheels also dictate selection of different types of cutting fluids. Adequate selection can be achieved, *without excessive inventory and confusion*, by classifying operations and selecting tool lubricants on the basis of this grouping.

Actually, the correct fluid, instead of "just any old oil," is a minor factor in adding to production costs, but it can be a large factor in cutting costs, by adding to tool life and raising production speeds. To see how modern selection methods work, let's look at the things that help determine the proper coolant.

• Straight Oils— The Sulfurized Oils

In this group are compounds with a wide range of sulfur content. In some of the compounds the only sulfur present is in an inactive state. Others go a little farther, and have slight amounts of active sulfur. From this beginning, the range of products runs all the way to jet-black oils with heavy amounts of active sulfur. Viscosities of these compounds range from 50 to 1600 SSU at 100 F.

The benefits of sulfur come from chemical activity at the point of cutting. Heat generated causes formation of sulfides on the under side of the chip; these sulfides, by contaminating the surface of the chip, help prevent chip-welding on the tool point. Thus, if welding is causing trouble, the introduction of sulfur will probably contribute to solving the problem.

Years ago, when the first sulfiurized fatty oils were presented to industry, they received a warm welcome because they helped solve the serious problem of chip-welding. Because of this initial success, many plants went overboard and made illogical applications.

As a matter of fact, continued study of the effects of sulfur has brought to light several serious disadvantages. For example, we know today that *excessive* sulfur causes rapid tool wear, because the sulfur causes peeling of the edge of the tool. Also, it has been learned that in operations where there is considerable rubbing action, the sulfer may create a serious heat problem, and cause galling on the sides of the tool. A third objection to excessive sulfur is its staining and corrosive action, quite pronounced on some metals.

Proper balance of sulfur *plus* other ingredients is the key to good performance. This fact has been shown in many cases where reduction of a heavy sulfurized oil with a mineral oil, reducing chemical activity, actually increases tool life. One of the dangers in fluid selection is that

SULFUR HELPS:

- **Tapping and broaching harder steels**
- **Slow-speed operations**
- **Practically all form-grinding**
- **Thread cutting with chasers**
- **Gear shaping**

SULFUR HINDERS:

- **Where rubbing is a problem, such as in hobbing**
- **Where staining would take place and be harmful**
- **Where high speeds are encountered**
- **With softer metals**

when a material is found to be outstanding on one operation, there is a tendency to try to apply the successful product to all operations causing trouble. This approach may be dangerous and costly, because a fluid that is excellent on one job may actually be harmful on another.

• Fatty Oils

Lard oils and other fatty oils have become much less common in modern machining practice. There are several reasons for this. Fatty oils are quite expensive, and new straight - oil and water - soluble compounds have been developed which can often produce equally good machining results at much lower cost. Further, the gradual increase in machining speeds has produced heat problems which the fatty oils sometimes cannot handle, because of their poor cooling ability. These oils usually create messy operating conditions also.

However there are still jobs on which fatty oils can offer benefits. For example, where sulfur might cause staining, yet film-strength requirements are higher than normal mineral oils can provide, addition of fatty oils is effective. Also, addition of fatty oils to sulfurized or chlorinated oils will increase film strength, but will not contribute to anti-weld properties.

Fatty oils are most successful in hobbing harder steels, with benefits also in machining more ductile materials such as aluminum, copper, and bronze.

• Chlorinated Oils

The presence of chlorine in a cutting oil also provides anti-weld effects. Formation of chlorides takes place at the point of cutting, and, as in the case of sulfides, these chlorides provide added lubrication. Chlorinated compounds have found their best application on stainless steels. In the high-chrome-nickel series of steels, large amounts of sulfur have not proven beneficial, but compounds with lower sulfur, plus chlorine, have been able to fill this gap to a large degree. As in the case of sulfur, if a chlorinated compound has been suggested by past experience on a particular problem, you should not go all out and get compounds which increase the amount of chlorine to excess. This is expensive and non - productive. In specific compounds, the presence of both sulfur and chlorine in an oil provides more benefit than the sum total of the sulfur and the chlorine acting alone.

Probably as much importance can be attached to the addition of other elements to modern cutting fluids as can be attributed to sulfur, chlorine, and fatty oils. Some newer elements are wetting agents, which permit better cooling and penetration. Others are polar compounds, which, because of their electrolytic attraction to metals, greatly resist any wiping or "squeegee" action of tools. With the problems associated with machining of recently developed alloys, which are very difficult to manage, the new chemical additives have greatly improved results.

A change from high active sulfur to a balance of low active sulfur plus the chemical additives has been effective even on low-carbon steels. In any steel where plastic flow of metal over the tool takes place, these balanced compounds are worth investigating.

EXAMPLE—A plant was shaping the internal gear teeth in a coupling made of 0.35-0.43 C steel, 321-352 Bhn. Feed, 0.006 ipr; speed, 33 sfpm. Oil X, high in active sulfur, gave 50% more pieces per grind than balanced Oil Y. This result could have been predicted because of slow speed and hardness of material.

EXAMPLE—In a recent typical case study, broaching S-816 cobalt-base, 20 chrome, 20 nickel jet turbine blades, with hardness R_c 28-32, speed, 18 fpm, in a horizontal chain broach, a heavily sulfurized oil could produce only 4000 blades per insert grind, while a low-sulfur, balanced oil averages 10,000 blades per grind.

• Solubles— Oil-base and Oil-free

Research has gone equally far in the development of more exacting and beneficial water-soluble oils and has even resulted in new chemical solutions which are completely oil-free. Simply for reference, we will call these new oil-free chemical solutions "synthetics."

Remarkable advantages can be gained from proper selection and application of water-solubles. Here again, by giving widely varied ranges of emulsifiers and extreme-pressure additives, and the occasional addition of sulfur, free fat, and/or other chemicals, the choice among solubles is so wide that entirely new attitudes must be created toward their application.

Today, there are water-solubles which are heavy enough in cushioning action to handle all but the most severe form-grinding jobs. At the other extreme are high-wetting, extreme-detergency products which can far surpass plain water in keeping a fine-grit grinding wheel washed clean. In between are many intermediate compounds developed to fill various specific needs in cuting or grinding. To make it easier to discuss these types, we will call the heavy-cushioning, extreme - pressure, high - lubrication solubles, "Class A" solubles, and the highly detergent, extreme-wetting types "Class C." "Class B" will then be those solubles half way between these extremes.

• Class A solubles

These solubles are characterized by high lubricity, usually the result of added fatty, extreme-pres-

sure agents. These solubles have evolved to a point at which they are handling a high percentage of metalworking jobs which could, at one time, be performed only with oil. Form grinding and maintenance of radii on grinding wheels can now be efficiently handled—with the exception of some plunge-grinding jobs maintaining a very complex form.

Class A solubles have also given exceptionally good results on heavy turning of the more ductile materials, such as aluminum. Other machining operations which seem to be most efficiently handled are milling, broaching, hobbing, most drilling, turning, reaming, and sawing. When grinding, Class A solubles are generally used with coarser-grit wheels, and for heavier stock removal.

EXAMPLE—In centerless grinding 8730 steel, R_b 98, some trouble with finish was being experienced. Wheel was 60-grit, L grade, speed 6500 sfpm. Stock removal was 0.015 in., and finish had to be 63 mu-in. rms. On this job, a Class A soluble averaged 33% more pieces per wheel-dressing than Class B or C solubles. The class A soluble cushioned the wheel better and prevented pickup and imbedding of the chips of this relatively soft steel, and gave better finish because it didn't permit the wheel to cut so severely.

• Class B solubles

This group is usually identified by an emulsion which approaches a balance between lubricity and detergency. These solubles will generally offer the best general grinding utility to any plant. They are most effective with medium-grain wheels and the majority of centerless, cylindrical, and external grinders, working on a variety of materials.

EXAMPLE—A turning job in an automatic turret lathe was set up for fairly fast speeds. The part was a hub-bearing seal of 4140 steel, hardness R_c 35. Speed of turning varied from 191 to 244 sfpm on the various diameters. A Class B soluble provided correct balance between cooling and lubricity, giving excellent tool life and dimensional control. Class A soluble caused tool burning and wide variation in size of workpieces, and a Class C soluble led to excessive tool wear.

• Class C solubles

In this group, lubricity gives way to detergency. As a group, these solubles usually show their greatest merit in the fine-grit, low-stock-removal, grinding jobs. Benefits are the result of excellent wheel-wash characteristics. Grinding of carbide tools with diamond wheels has been definitely improved by application of Class C solubles. If chip clogging, or dirty working areas of a machine are causing trouble, Class C solubles should be considered.

Although the greatest use of this group would be on grinding, there have been several excellent applications made on the machining of some rather hard steels at high speeds. In such work, the emphasis is on cooling and penetration, rather than lubrication, and Class C solubles most closely fit these requirements.

Another type of Class C solubles are the "synthetics," oil-free compounds with extreme detergency and extreme penetration, which have found their most effective application in extremely fine-grit grinding, or in the very-high-speed machining of hard steels.

Synthetics are, however, not without limitations. Because of the chemical nature of these compounds, they tend to deposit a microscopic residue film which eventually hardens, and, after six to eight months, will build up on moving surfaces of the machine to such an extent that the film may impede the function of the machine. Therefore, Class C solubles should not be used on machines where the bearings, tool slides, and other such areas are exposed to the compound in operation, unless extreme care is taken with maintenance, to prevent the ill effects just mentioned.

Much work has been done in the search for a plasticizing agent for "synthetics," to overcome the disadvantages of chemical deposits. The inclusion of plasticizing materials has helped machine maintenance, but such materials generally tend to reduce the wetting and detergency characteristics, which are the chief gains from this class of solubles.

EXAMPLE—Drilling a ⅛-in. hole through the entire length of a ¼-in.-dia capscrew of C-1038 steel, 1¼ in. long, in three operations, a Class C soluble gave double the tool life on all three drills, compared to a Class B soluble. Even worse results were experienced with Class A solubles. Success of the Class C soluble came from penetration and cooling properties.

• Special solubles

Besides the various ablities of the compounds already described, research has found special cures for other problems. For example, in machining cast iron, rust protection has long been a critical problem. Today there are solubles which are well suited for machining cast iron, and, far from creating a rust problem, actually offer this metal exceptional protection from rust.

Another problem has been the effects of hard water. Today there are several solubles of the different classes, which are well suited to manage a hard water problem, which, at one time, led to split emulsions, with attendant rancidity. To combat this, plants made sacrifices in machining efficiency to get a stable product. That is not necessary today.

"He insisted we try the jet!"

WHY "SHOP" COURSES

Is the machine-tool laboratory a "pipe" course, taking unnecessary time to teach unneeded skills? What should be the objectives of such a course, and how can it best serve the student? Here are six objectives, with case studies

There is no argument as to whether there should be a machine-tool laboratory course in an engineering institution; there are, however, diverse opinions as to what primary and secondary objectives of such a course should be. It is my intention here to present clear-cut, definite goals.

THREE PRIMARY OBJECTIVES

The first primary objective of any machine-tool course is to inculcate the student with the fundamental principles of metal processing and to introduce him to the basic machine tools. Fundamental are those principles which deal with cutting speeds, heat treatment, cutting lubricants, and related material.

Here at St Louis University, I have observed students who were given an insight into metal-processing principles before any introduction to a machine tool, and have compared these students to some I first introduced to basic machine tools. I found in nearly every case that those students who were first given the principles of metal processing were not only more confident and much more enthusiastic about undertaking machine-tool work, but also were concerned, throughout the course, with the underlying principles involved in their work. Students should study, recognize, and understand the principles of metal processing, then learn how to apply these fundamental principles to practical operations.

The second primary objective is to inculcate into the student a deep appreciation of the necessity to to integrate theory with practice in technological undertakings. The engineer does not have to consider theory to the same degree as the physicist, but he must be able to use the data and solutions obtained from scientists relative to physical systems in his practical work. It makes little difference what the student's chosen field of engineering is—his work will sooner or later require that he understand and have a working knowledge of theoretical data and the ability to apply this information to his practical engineering problems.

The third primary objective is to encourage, nurture, and develop creative thinking among one's students. The teacher should carefully observe each student and take note of his special abilities and talents. This is no easy task, but it can be done. Each student should be made to adhere to some challenging schedule of both mental and physical work, and as he progresses and obtains some proficiency, he should be given the opportunity to work out and solve practical problems in the laboratory.

No student should ever be considered "hopeless," regardless of his apparent helplessness in the laboratory after a brief period of time. Occasionally, the backward student actually is superior both mentally and physically to the other more-progressive individuals, but is rendered helpless, inefficient, or clumsy by some minor emotional block.

Here is a case in point: Out of a class of 16 students, I had one in particular who was very courteous, intelligent, and who generally led his class in grades in his lecture sessions. However, in the shop he would be the last person to draw tools from the crib at the beginning of the session and the first one out of the shop at the end of the 3-hour period. While at his assigned machine, he would pretend to be busy and delay as long as he could the actual turning on of the machine. I observed him for two periods but I did not give him any special attention in the hope he would get himself in hand and work out his own difficulty. This did not happen, and during the third period I asked him to see me in my office. I learned that his father was the owner of a machine shop and had on one occasion put his son to work in it during school holidays. He had an accident and damaged the machine to the extent of some hundreds of dollars. His father upbraided the boy before the men in the shop and shouted that he did not have an ounce of practical common sense in his head.

After I had learned of his hidden fear of being humiliated before his class mates in the event he should make some error or damage another machine, and his obvious lack of confiidence in his own judgment, I promised the boy that I would never embarrass him for any error or mistake that he should make in class, and that we would work together to show his father that he was not just a bookworm. After approximately four class periods, the boy was well up with his classmates; he could hardly wait to finish his tensile-test specimen (which he did in very good time), so he could take it home

IN COLLEGE?

EUGENE W DUNLAP, Instructor in Engineering,
Supervisor of the Machine-Tool Laboratory, Institute of Technology,
ST LOUIS UNIVERSITY

to show his father that he had practical ability too.

It is the duty of the teacher to help the student awaken from lethargy and to activate him from his recidivism to creative productivity.

THREE SECONDARY OBJECTIVES

One secondary objective is to develop the student's appreciation and respect for machine-tool work and for the men and women engaged in the actual operation of such equipment. This is no easy task, for while a fine teacher may inspire and encourage young people to obtain the utmost from such a course, the shop teacher sometimes must overcome indifference, opposition, and even academic criticism which is expressed in various ways towards such a course by colleagues in and out of the institution. The attitude of some staff members as well as students toward a machine-tool course is that of an intellectually gifted scientist being forced to undertake menial labor which, if not actually repulsive to him, is certainly not to his satisfaction or liking. I generally find electrical engineering students the most resistant to accepting a machine-tool course, even though they are required to take it. I get such arguments as: "I'm not going to be a machinist, so why force me to study this stuff," or "I'll never run a machine after I leave college. I don't like machine work; that's why I'm going into electrical engineering." It is not always easy to break down such mistaken ideas on the part of students who have been given incorrect information by people they admire and believe.

This situation is in part brought about by two conditions:

1. The quality of machine-tool courses is not sufficiently high, and the level of instruction is too low.

2. Some instructors of such courses do not enjoy the prestige of having a university degree. Those who do, as well as those who do not, become increasingly unhappy and annoyed at the attitude and inferences cast by colleagues that shop subjects are of the "snap course" type, hence require no study, preparation, and intellectual development on the student's part. Nothink could be more erroneous than that.

Mutual respect and appreciation by students and teachers for the diversified fields of human endeavor should be sought after. It is especially important that the young engineer should learn that tool-die-makers, machinists, draftsmen, and production men and women must have skill, talent, and intelligence to perform their various duties. They have an equal right to be respected for what they do and know and are to be given the same courtesy and treatment as the engineer would expect to receive for himself. The engineer needs his men, and the men need their engineer—such a team, organized and working in harmony and with mutual respect for each other's talents, is unbeatable.

Another secondary objective is to train the student in logical and efficient working procedures. I shall assume that the student has acquired good study habits, but studying efficiently is not the same as working efficiently relative to manual activity and production. The engineer must develop logical procedures coupled with efficient working habits, for his degree of success in the world will be largely determined in direct ratio to these two factors.

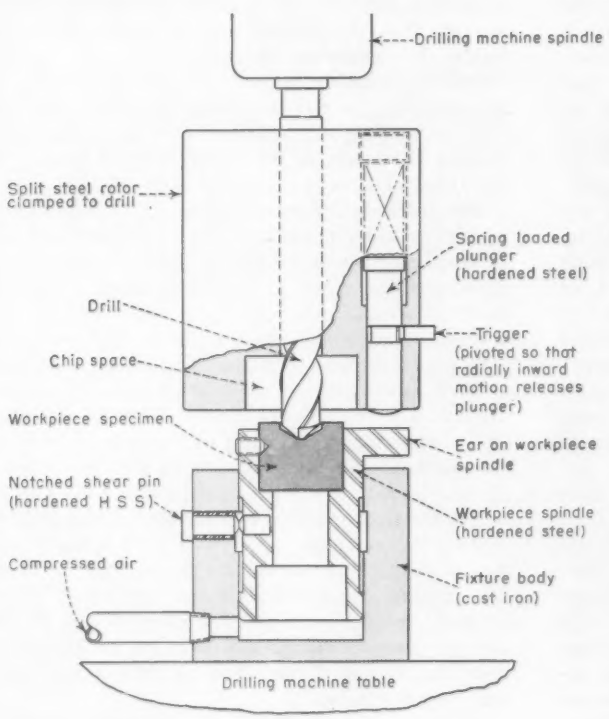
The third secondary objective is to develop a deep appreciation for personal and group health and safety in plant operation. The engineer should be able to appreciate what a milling-machine cutter can do if it breaks under pressure while cutting, or if oxygen or acetylene tanks explode. And how abrasive dust is dangerous to the eyes, lungs, and mouth, as well as the finished ways of an adjacent machine tool. It is my experience that students do not realize how dangerous a machine tool can be if they are only lectured on these aspects; in my own classes I demonstrate how a lathe might catch a necktie and break the wearer's neck by actually holding a tie and letting the machine work catch it. I actually show the students how one's shirt sleeves can be caught in a milling-machine cutter and how easily an arm or hand could be cut off. The effectiveness of these lecture-demonstrations can only be judged on the fact that to date I have had no serious accident in any of my classes.

In these remarks, I have by no means attempted to cover the multitudinous aspects or facets of such a course and its various implications. I have presented what I consider to be the essence of such a course with regard to objectives; I have tried to set forth nothing more.

'FLYING STOP' SHOWS DRILL CUTTING ACTION

CARL J OXFORD JR. Research Engineer, NATIONAL TWIST DRILL & TOOL CO, ROCHESTER, MICH

THE COMPLEX cutting action of a twist drill has been studied and discussed time and again, but in most instances authentic evidence of this phenomenon has never been presented. Exploring this action under actual operating conditions was undertaken by devising a quick-stop technique which would permit examination of drill chips in the process of formation, both along the cutting lips and under the chisel edge. It is interesting to note that chips produced along the cutting lips are essentially similar to those formed by other metal-cutting operations. In addition, the split (crankshaft) point for heavy-web drills was investigated and its operation is described in this abstract of an ASME 1953 Annual Meeting paper (No. 53-A-167, to appear in *Transactions*)

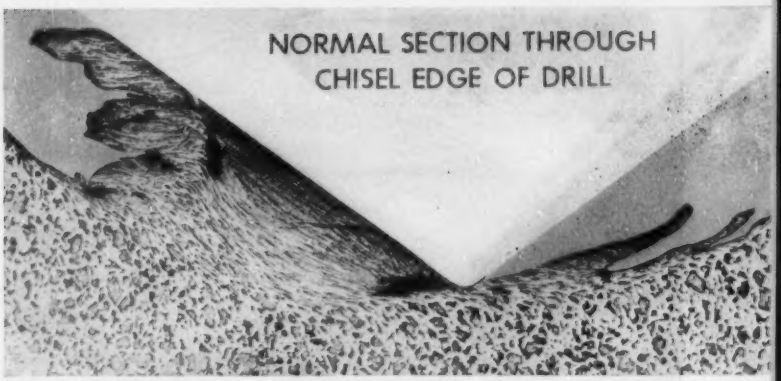

Drilling machine spindle
Split steel rotor clamped to drill
Spring loaded plunger (hardened steel)
Drill
Trigger (pivoted so that radially inward motion releases plunger)
Chip space
Workpiece specimen
Ear on workpiece spindle
Notched shear pin (hardened H S S)
Workpiece spindle (hardened steel)
Compressed air
Fixture body (cast iron)
Drilling machine table

HOW IT WORKS

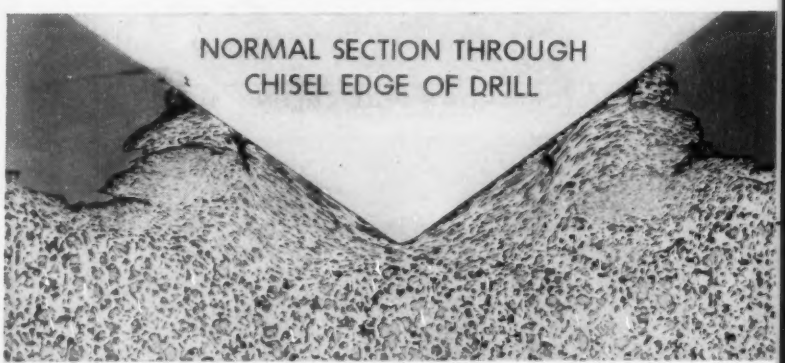
Alignment between the drill spindle and workpiece spindle is maintained to 0.002 in. max tir. A compressed-air cushion is maintained under the workpiece spindle to relieve part of drilling thrust load from the shear pin. It also maintains the workpiece in contact with the drill during the axial feed motion after the shear pin is broken. In operation, the hole is drilled to the predetermined depth, when the trigger is struck lightly with a steel bar. This releases the spring-loaded plunger so it strikes the protruding ear which in turn breaks the shear pin and virtually instantaneously accelerates the workpiece spindle to drill-spindle speed. Investigations to date have been made using a ¾-in.-dia taper-shank twist drill because it is large and rigid enough to permit direct visual observation and to accommodate the quick-stop rotor

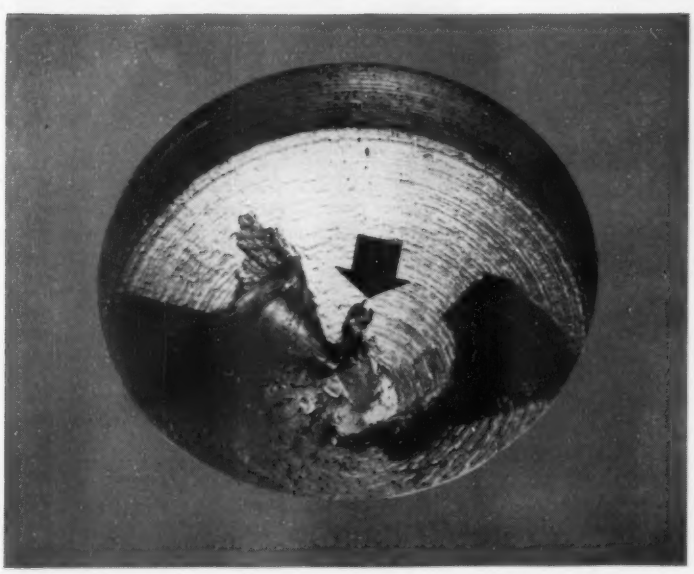
TEST TECHNIQUE

All steel specimens were drilled at a speed of 250 rpm (50 sfm peripheral speed), feed of 0.013 ipr, using drills accurately sharpened so variations in angle and height of cutting lips did not exceed 0.0005 in. To observe chip formation along cutting edges, it was necessary to section specimens along planes crossing the chips in the desired direction. To do this it was necessary that chips be given a protective hard coating to prevent excessive rounding of the edges during metallographic polishing. Because of the many differently oriented sections to be taken, it was not desirable to cut specimens open before plating. The electroless nickel-plating process of Brenner and Riddell was tried with excellent results. This is a catalytic chemical-reduction process using no electric current, and uniform plating of unlimited thickness can be obtained. After plating, holes in the specimens were molded full of a transparent thermoplastic which permitted a visual check of the orientation of sections to be taken. Sections were prepared by careful grinding and metallographic polishing, followed by an etch in 4% Picral to permit observation of structure and flaw patterns under the microscope.



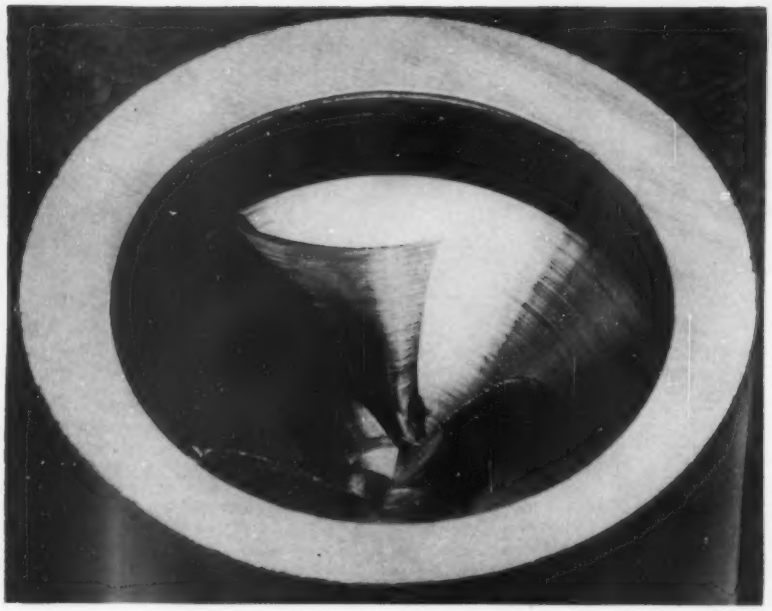
HERE IS THE ACTION under the chisel edge of the drill while working an AISI 1020 steel specimen. This section is a plane perpendicular to the chisel edge at a 0.037-in. radius. If the wide variation in radius (because of the plane section) across the 36X photomicrograph is disregarded, cutting action resembles that of a tool with a very high negative rake of about 56°. Note severe built-up edge acting to make effective cutting rake more positive and a segmental chip sliding up over the built-up edge. Part of the deformation in the so-called segmental chip is probably because of wiping of the cutting edge in a direction normal to the picture plane





▲ **SECTION PERPENDICULAR** to chisel edge (36X) at exact center of drill. Directly under point the only tool velocity is that of feed in the axial direction. Deformation of metal at center thus resembles that caused by an indenting punch. Toward the sides, deformation becomes more complex and severe because of the combination of rotational and feed velocities

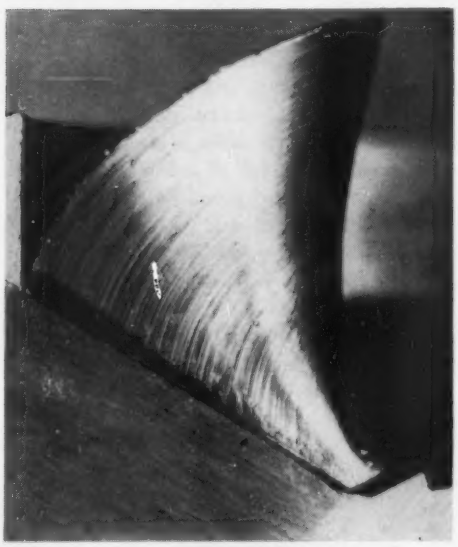
◀ **VISUAL STUDY** using a high-power (up to 80X) stereomicroscope, showing an actual chip formed by chisel edge. It appears that when this chip fills the space between drill-clearance surface and bottom of hole it is wiped or extruded toward the cutting edge of the drill. The chip is forced into the flute and is usually (in the case of steels) plastered about the apex of conical chips produced by the cutting lips and carried off by these chips. Sometimes, part or all of the chisel-edge turns over the edge of the flute and is ejected as a separate highly deformed ribbonlike chip. (Arrow indicates start of ribbonlike chip. Note overlap chisel-edge chip formation)



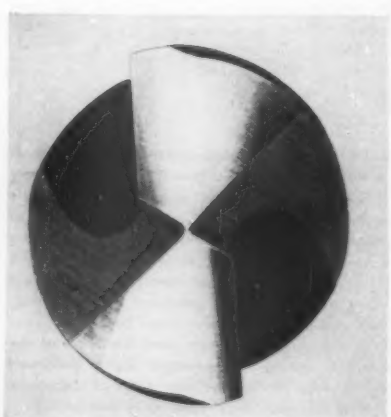
TWO CHISEL-EDGE CHIPS overlapping. When drilling both steel and titanium at 0.013 ipr, this overlap is approx 0.020 in. long. At a radius of 0.010 in., the end of the overlap, lead angle of feed helix is only 11½°, indicating that feed velocity has been reduced to about 20% of total drill velocity at this point. Belief is that this overlap is a result of the indenting action of the chisel edge in the region where axial feed velocity is a significant component of total drill velocity. Probably some of it is also because of simple lateral flow from lack of restraint on one side of chisel-edge chip and appreciable restraint in all other directions. (One of primary cutting-edge chips has been removed to permit better view of unusual chisel-edge chip formation encountered with Ti-150A titanium alloy)

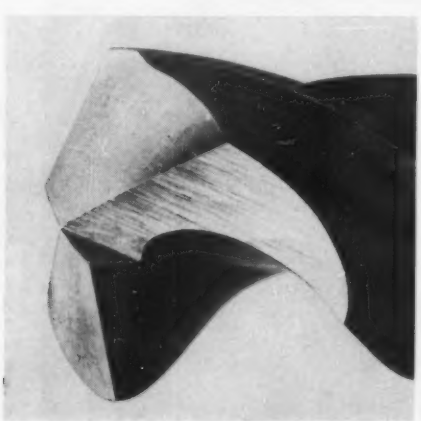
'FLYING STOP' SHOWS DRILL CUTTING ACTION

continued

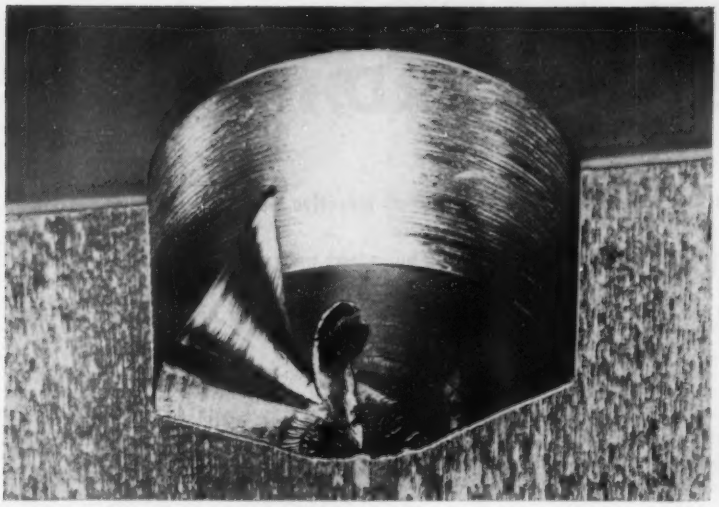


CHIP-FLOW ANGLE VARIES widely along cutting lips, so an additional study was undertaken to determine if chip-flow angle could be related to drill geometry. Specimens were sectioned on a plane parallel to cutting lips and drill axis. The plane was ground to center or slightly beyond so the print of cutting lips could be seen. Note chip flow lines are appreciably inclined to the normal to cutting edge near hole center, but that this inclination reduces with increasing radius. It was found that chip flow angle can be related to drill-point geometry in a reasonably predictable manner





THE CRANKSHAFT-POINT DRILL is first sharpened in the normal manner, yielding a long chisel edge. A second grinding cut is made on heel-side of the point parallel to chisel edge but inclined at 30 to 45° to drill axis. Grinding cuts are carried along chisel edge and ground very close to center so web thickness is reduced to nearly zero. This provides two additional cutting edges which can produce fairly conventional chips. As these cutting edges are on center and cannot be undercut much, their normal rake is between 0 and 5°. Inclination of cutting edges is approximately zero so produced chips should flow normal to cutting edge but are deflected outward by angular side

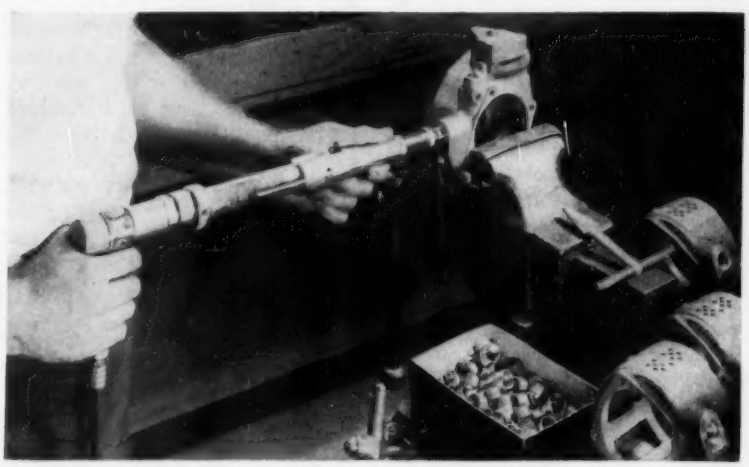


CHIPS PRODUCED BY CRANKSHAFT-POINT DRILL. Separate chip produced by auxiliary cutting edges is clearly evident. Note fairly large built-up edge at base of secondary chip, possibly due to very low cutting speed near center of drill. To eliminate wandering, if crankshaft-point drills must be started without a bushing, it may be helpful to rotate secondary cutting edges towards regular cutting edges. Because of point geometry, this produces a higher center point which can be indented into work material, providing a guide for drill starting.

HEAVY-WEB DRILLS

The heavy-web drill has been found to have higher effective rake angles than drills of regular design, but it does have the disadvantage of a longer chisel edge, requiring higher thrust forces and increased torque. This type of drill is desirable because of its rigidity for deep-hole drilling in tough materials. To improve this condition, the crankshaft or split point has been developed, so-called because it was first applied to the small-diameter heavy-web drills used for drilling oil holes in automotive crankshafts. The two preceding pictures illustrate how to grind the crankshaft point, and resulting separate chips.

Are your female threads stripping?



INSTALLING ⅝-18 wire-thread inserts for dual position of dead handle. Note upper pad where three ¼-20 wire inserts are used for securing live handle

Stripped and damaged threads in the magnesium castings of Rotor portable air tools—a result of ministrations by shop-worker users not famed for gentleness—led directly to a design conversion to wire-thread inserts in the critical areas. Rotor Tool Company, Cleveland, studied the problem because the advantages of lightness were nullified by customer reaction against frequent thread trouble.

Three points on the tool were giving the trouble because of repeated removal and replacement. First was the dead handle, which is adjusted to either 90° or 110° from the live handle for operator convenience. This is done by engaging a ⅝-18 threaded stud in either position. Second point was the live or throttle handle, attached to the magnesium body casting with three ¼-20 capscrews and removed from time to time for tool maintenance. Third area was for a ⅛-27 pipe-thread filler plug which is removed daily to refill the lubricating-oil reservoir. All required the use of Heli-Coil stainless-steel wire screw-thread inserts for repair.

Repair installations proved successful, so design was altered to provide inserts at these points. Thus the one-time repair operation is now incorporated in original production. The only added operation is to put in the insert—in a larger drilled and tapped hole.

PUT STANDARD MINUTES

One way to prepare better for a competitive price situation is to install an incentive wage plan, such as the Standard Minute plan described here. If your plant is on a straight day-work basis, you may save up to 20-30% of direct labor cost; your employees can earn 20 to 25% more take-home pay; and production can be raised 50 to 100%

If you're caught between rising costs and falling demand, which means lower selling prices or lower volume, one of the things you should consider carefully is the possibility of installing an incentive wage plan.

Here, in question-and-answer form, is the Standard Minute Plan, one form of incentive payment, which benefits management, labor, and the customer.

Management can expect reduced labor costs; increased productivity; lower "per piece" cost of fringe benefits; better utilization of equipment; higher wage rates, attracting a better class of worker; lower turnover; and better production scheduling, control of cost, estimating, and methods analysis. These things lead to lower selling prices for the customer.

Results are equally favorable for the worker. Perhaps most important, take-home pay is higher. Also, payment is more in line with individual effort, which is really "equal pay for equal work," instead of equal pay for equal hours spent at work; direct recognition (in the form of more money in the pay envelope) of efforts; workers are "put in business for themselves"; and each worker can demonstrate his true worth to his company without endangering the wage rates of his fellow-workers.

Speaking of labor, union leadership, after early experiences with rate-cutting, "human engineering," speedups, and other forms of early mismanagement, has traditionally opposed incentive payment plans. An increasing number of such contracts, and the gradual maturing of the labor-management relationship, have brought about basic changes in the attitude of top labor leaders, which will have far-reaching effects on contract negotiations from now on. In December, 1953, the national headquarters of two major unions said, in effect, "Because many of our organized plants are working on incentive payment, we are re-examining our stand on this matter."

Q. What is an incentive plan?

A. It is absolutely *not* a speedup. Each worker has a natural working pace, just as any man has a natural walking pace. It is this working pace which is used as a standard for payment. The typical incentive payment plan simply cuts waste time, and pays the worker for what he accomplishes. In installing the plan, operations are studied, and more efficient methods and assignment of personnel usually result.

Q. If I don't make the worker work faster, how can I hope to save money with an incentive plan?

A. Long experience with installation of such plans, according to Geo H Elliott & Co, management consultants, shows that the average plant on a day-work basis is working at about 25% below standard, while the average plant on a Standard Minute Plan is working 25% above standard. The saving results from improved methods, better worker attitude, and elimination of waste time. This last saving is very important. If a worker is being paid on incentives, he is unlikely to spend time waiting for tools, running errands, or waiting for work.

Q. How would I go about installing an incentive plan?

A. The first thing to decide is who is going to install the plan. You must choose between your own engineering staff and an outside consultant.

Q. How do I decide this?

A. There are good and bad points about either course. If you hire a reputable consultant, you won't have to "beef up" your existing engineering staff for a short time, with subsequent layoffs or an unnecessarily high overhead cost, or else take considerable time installing a plan, using only existing personnel. Also, the workers will probably have more confidence in an outside firm, whose main interest is in providing a good system, rather than making spectacular savings right off the bat, at the cost of numerous arguments about unfair rates, and the like, leading to later unrest.

On the other hand, if there is already unrest and dissension in your organization, it would be unwise to try to hire an outside consultant, because existing dissension would simply be aggravated.

Also, if the consultant is hired to do the job, you must be prepared to give the consultant "line" responsibility in the areas of his work; to have the consultant report to someone high enough in management to give a definite and prompt answer to questions that come up; and to give the consultant authority to put answers into effect. If you are not willing to give the consultant these privileges, you are better off without his services.

TO WORK

KENNETH L KLINE
ASSISTANT EDITOR

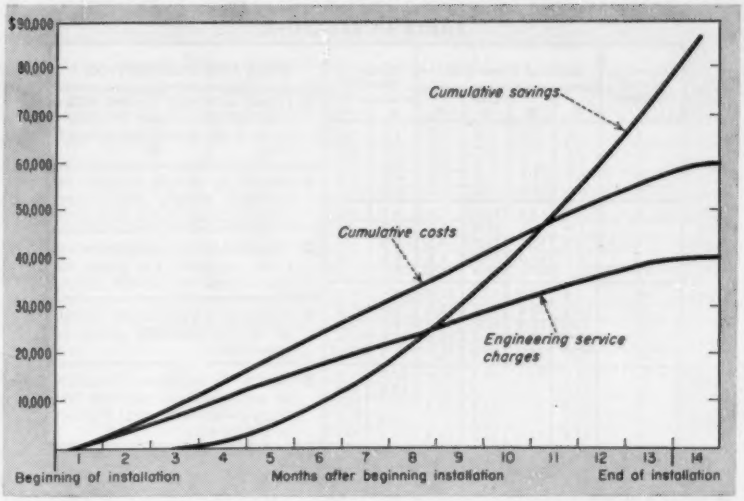
Q. Then what's the next step?

A. It may seem surprising, but the next step is to call in union leadership, and tell them what you are about to do. The benefits to the worker should be emphasized, because, as explained before, the worker gains as much as management. It will also pay to have one or more union representatives trained in the methods of time study, in order that, after rates are set, the union will have an informed judge of standards, in case later grievances come up.

The men selected should be tested with suitable aptitude tests, to find out which of the candidates are most suitable for this kind of work. If a consultant is hired, the consultant will generally be equipped to explain the goals and methods of the incentive installation, to test and select, from the union candidates, the union time-study representatives, and to train both union and company time-study men in rate-setting procedures.

Q. When I've trained a time-study staff, do I start at the jobs causing the most trouble?

A. No. Start at the beginning of the production line—that is, in the departments where the first operations are performed on the product. Otherwise, the flow of work already in the plant will be disrupted, and the scheduling you have evolved will be thrown off, and some men may run out of work at the gap created. As a matter of fact, it is generally better to avoid the most troublesome spots until some success has been shown in jobs which are easier to handle.



Q. How much would it cost for a consultant to install a typical system?

A. This chart, from the files of Geo H Elliott & Co, shows the estimated costs and savings for an actual installation. The plant described manufactures electrical and mechanical machinery, and has an annual payroll of about $750,000, of which $500,000 is direct labor costs. The chart is based on a permanent staff of three time-study men—2 company, and 1 union—and two clerks. The annual maintenance cost is $20,000, and drops to about $15,000

Q. Then what?

A. Because your main purpose is to eliminate waste time, each operation is studied for the actual time needed for the job, and methods are studied to see if improvements can be made. Often such study will show that one or more workers can be removed from a job which is taking several men's time. What also happens sometimes is that an *added* man will save money in the long run.

Q. When methods are improved, how do I set rates?

A. First make time studies, using one or more of the currently accepted methods — stop - watch, M T M, and so on. The studies must be made carefully, and you must have a well-seasoned man, with time-study experience—preferably someone with several years of shop experience—as supervisor.

Q. Suppose I find that a man takes 2 minutes to do a particular job. Is that the standard time?

A. Not necessarily. First we have to establish what the 2 minutes is. Generally the established time is given as the time an average worker will take, working at incentive pace, to do the operation.

Q. What's "incentive pace"?

A. As we said before, each worker has a "pace," similar to his walking pace. You walk fast or slow, depending on how much hurry you're in. In the same way, each worker will work somewhat faster than his normal pace if he has reason to do so. It might be said that incentive pace is the working rate that a worker will be able to maintain, day after day, without becoming too tired to continue this pace. Another way of putting it would be to say that incentive pace is how fast a worker will be willing to work, provided he is given enough reason to do so.

Q. How much faster than normal is the incentive pace?

A. About 25%.

Q. How did you arrive at that figure?

A. Years of experience have shown that you need a 25% incentive to generate a wide cross-sectional response among workers. Any lesser amount will not be sufficiently attractive to enough workers, and, to widen the response to incentives, you will have to increase the *rate* of the bonus, so unit costs will rise, and the system becomes impractical. Therefore, an incen-

TABLE I—REACH—R

Distance Moved Inches	Leveled Time TMU				Hand in Motion	
	A	B	C or D	E	A	B
1	1.8	2.1	3.6	1.7	1.3	1.5
2	3.7	4.3	5.9	3.8	2.8	2.7
3	5.0	5.9	7.3	5.3	3.8	3.6
4	6.1	7.1	8.4	6.8	4.9	4.3
5	6.5	7.8	9.4	7.4	5.3	5.0
6	7.0	8.6	10.1	8.0	5.7	5.7
7	7.4	9.3	10.8	8.7	6.1	6.5
8	7.9	10.1	11.5	9.3	6.5	7.2
9	8.3	10.8	12.2	9.9	6.9	7.9
10	8.7	11.5	12.9	10.5	7.3	8.6
12	9.6	12.9	14.2	11.8	8.1	10.1
14	10.5	14.4	15.6	13.0	8.9	11.5
16	11.4	15.8	17.0	14.2	9.7	12.9
18	12.3	17.2	18.4	15.5	10.5	14.4
20	13.1	18.6	19.8	16.7	11.3	15.8
22	14.0	20.1	21.2	18.0	12.1	17.3
24	14.9	21.5	22.5	19.2	12.9	18.8
26	15.8	22.9	23.9	20.4	13.7	20.2
28	16.7	24.4	25.3	21.7	14.5	21.7
30	17.5	25.8	26.7	22.9	15.3	23.2

CASE AND DESCRIPTION	
A	Reach to object in fixed location, or to object in other hand or on which other hand rests.
B	Reach to single object in location which may vary slightly from cycle to cycle.
C	Reach to object jumbled with other objects in a group so that search and select occur.
D	Reach to a very small object or where accurate grasp is required.
E	Reach to indefinite location to get hand in position for body balance or next motion or out of way.

Q. What is MTM?

A. MTM is a system of estimated times. The system is based on the principle that there are a very few *basic* body movements, such as the one shown here, some combination of which will completely describe all the motions needed for an operator to complete any machining (or any other) operation. Time units are 0.036 seconds (0.00001 hours). Figures given here have a 15% allowance for non-productive time (Copyright, 1950, MTM Association for Standards and Research)

tive level of 25% is generally regarded as the point of least unit cost.

Q. That's a little confusing. How does it work in practice?

A. Take the example we were talking about before. Let's say the job under study could be done in 2 minutes, working at incentive pace. (It's up to the time-study man to decide whether the worker is working at normal, sub-normal, or incentive level. That's why his experience is so important.) Say we add about 20% to that (the exact figure differs slightly in different plants), for personal fatigue, and delay. That gives us 2.4 minutes. Then we add 25%, as an incentive bonus, and we arrive at a time of 3.0 minutes, which can be called 3 Standard Minutes. This represents what we feel is a fair time for the job at normal pace.

Q. Standard Minutes?

A. A Standard Minute is one of several ways to express how much you think a worker should be able to do in one minute of actual time.

Q. Why use Standard Minutes to express that?

A. Standard Minutes have several advantages over other ways of expressing productivity. First, a worker can judge easily how well he is sticking to his production goal when that goal is expressed in minutes. A man is being paid for his time, and if he can see that he has earned, say, six Standard Minutes in four actual minutes, he is two minutes ahead of the clock . Another advantage of Standard Minutes is that they express a true measure of factory output or potential, so you can predict quite accurately how much production any real or imaginary plant is capable of, **regardless of the product,** if the operations are correctly laid out, and the times are right.

Standard Hours involve the same principles of rate-setting as Standard Minutes, but a worker is accustomed to thinking in terms of minutes, and decimal parts of an hour are harder to grasp.

When incentives are based on so many cents per piece, a man can't see how he's doing without figuring his rate, dividing by cents per piece, giving him pieces per hour, comparing pieces per hour with the number of pieces he's done, looking at his watch to see what part of an hour he's been working, and then deciding whether he's ahead or behind standard. Also, when wage rates are changed, it is necessary to realign all the piecework rates. With Standard Times, negotiations are conducted on hourly rates, but the established times remain the same.

Q. When you've established the Standard Time, how do you pay the man?

A. When an incentive plan is installed, it is important to continue to guarantee the present base rates of pay, so that no one will earn less than he's already making. Otherwise those who earn less will try to defeat the system, and that's just what we don't want. So the first thing to do is to guarantee the worker his hourly rate, *whatever his production.* Then, in order to stimulate him into producing at incentive pace, you offer him a bonus, based on what you have found to be the correct time for the job.

For example, if a man's base rate is $1.20 per hour, and he's doing a 3 Standard Minute job, he earns $1.20 for 60 Standard Minutes of production, or $0.02 per Standard Minute. If he does 25 pieces in one clock hour, he'll get paid for 75 Standard Minutes, or $1.50. If he does 20 pieces in an actual hour, he'll get $1.20, for 60 Standard Minutes. If, though, he does 18 pieces in a clock hour, he'll get $1.20, his base rate, because he's worked at 54 Standard Minutes, which is below standard.

Q. Well, how does this encourage the man to do more work? If most plants on daywork are working about 25% below standard performance (60 Standard Minutes per hour), the average worker will have to work a third again as fast as he has been working, just to get to "standard," and then work 25% faster to get to incentive performance. But you just said he will only work 25% faster to get 25% more pay, but there he will usually stop, at least in a "100% incentive" plan.

A. A very important point. We said that plants on daywork were averaging 25% below standard performance, but that each worker has a "pace." He works at this pace *when he is working.* What we do to get to standard performance is

eliminate waste time. The worker is encouraged, in an incentive plan, to report all wasted time because it is money out of his pocket. On daywork, it doesn't matter to him whether he is working or not. What we are really trying to do is get the delays out in the open and eliminate them. *Then* we think the man may work at incentive pace to earn 25% more pay.

Q. Does this always work out?

A. Almost, but not always. Take a case where a man has been producing at 40 Standard Minutes per hour. When his standard is set, and waste time is taken up, you may find that he would have to increase his output 10 or 15% just to reach 60 Standard Minutes per hour, to begin working on bonus. It is possible that he is just unwilling to exert himself enough to make 60 Standard Minutes per hour. There are three things you can do. First, you can explain the situation to him, because you have established the rate at 80% of what the normal worker can do, and, with the union's cooperation, switch the man to another job, to see if there wasn't something wrong with his being in the other job in the first place—lack of aptitude, lack of interest, or perhaps some personal difficulty. Second, which isn't very hopeful, is to leave him alone, and let him drag down overall effiicency.

If the same trouble goes on after several transfers, it is for the good of both the union and management that the man be discharged, because he is a discredit to the union, and a liability to the company. If, for some internal reason, it is impossible to transfer or discharge the man, it may be a temptation, as a last resort, to increase the base rate or loosen the standard enough to encourage him to work hard enough to make 60 Standard Minutes per hour, and begin making ing incentive pay. This is an extremely unwise procedure, though, because once you have gone off base rates, which have been agreed upon beforehand, you create a break in the dike, leading to later complaints about rate injustice which will almost always be more trouble than you saved at first.

Q. Suppose the problem is the other way around. When the rate is set, you know from experience that the man will be able to work much faster than Standard Time. Won't he be able to go all out and earn 50, 60, or even 70% bonus?

A. In every plant there are a few exceptional workers who will be able to maintain a higher pace, day after day, but they're unusual. The average man may work 80 or 90 Standard Minutes in one hour, but then he'll stop and rest, go to washroom, talk, smoke a cigarette, or waste time some other way, and the end result will be that at the end of the day or week, he will, if he has been working at incentive level, end up with an *average* of about 75 Standard Minutes for all the hours he has worked.

As a matter of fact, in most plants under normal conditions, average over-all efficiency in a given plant will not vary more than 1% from one month to the next.

Q. Do I have to set up a new base-rate structure?

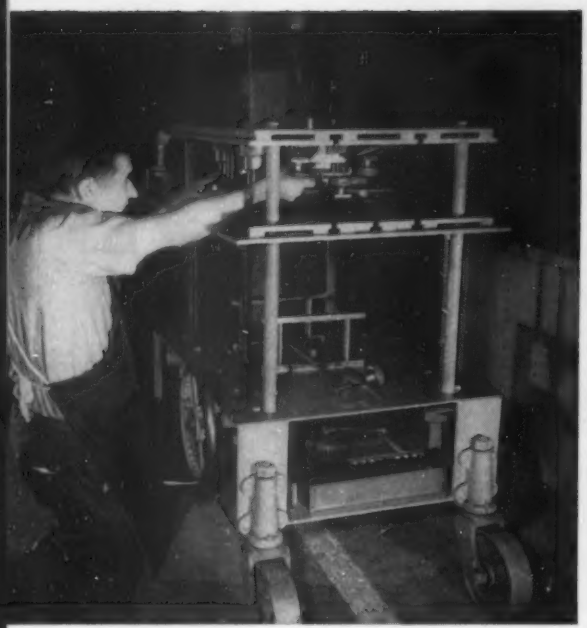
A. No, but it's a good chance to pull base rates into line, if there are any inequities . . . and there usually are. The rule here is also that no one should earn less by installation of an incentive system. In almost every department you will have different rates of pay for the same work. If you don't set a single rate for each kind of work, there are three alternatives. You can continue rates as they are, paying each man his present base. This is contrary to the principle of equal pay for equal work. Second, disregarding extremes, you can set the rate as the average for the experienced worker in the department. Third, in the case where a few men have very high rates, because of special skills, you may have to set the base at the upper limit of the average worker, and subsidize the few workers on a very high rate, by means of an hourly addition to their earnings under the incentive system.

In the case of job-evaluated systems, an occasional employer will be unwilling to settle for the maximum rate, and will want to set the base rate at the mid-point, or even the minimum of the rate range for the job. This is not a good idea, but it's sometimes done. Almost all the ideas about cutting corners, to try to save a little money, defeat the purpose of an incentive system, which is to tell the worker that you intend to reward him in direct proportion to his efforts. If you try to cut the base rate or bonus opportunity in some way, you will probably pay for the attempted economy by getting lower productivity from the workers, because the system is figured to give the maximum benefit to both the worker and the owner.

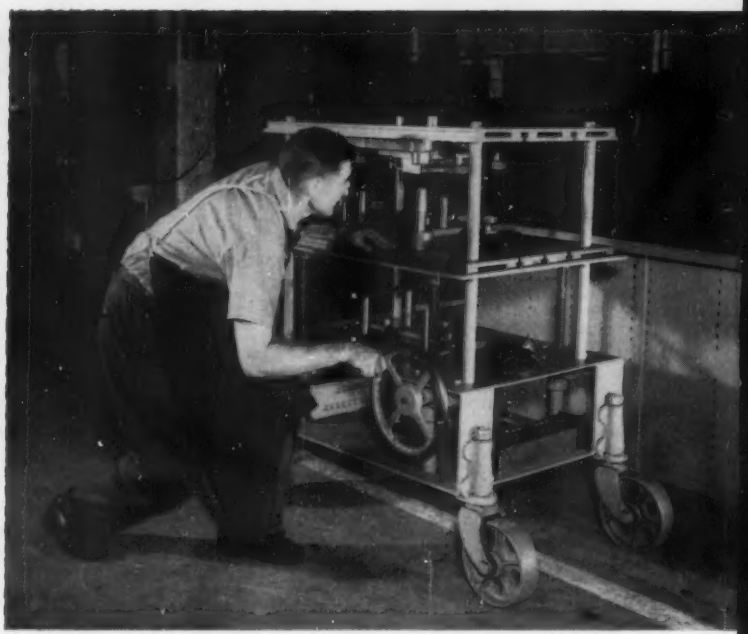
COMPANY PRODUCT	% INCREASED PRODUCTION	% SAVINGS	% INCREASED EMPLOYEE EARNINGS
Ventilating fans	110	40	27
Electrical equipment	36	14	17
Small metal stampings*	33	10	9
Glass fiber products	85	33	25
Heavy sheet metal products	51	17	25
Precision bearings and electrical fixtures	48	16	24
Air conditioning equipment	42	14	19
Plastic toys	56	22	22
Machinery and materials handling equipment	47	20	18
Locks and keys	80	32	23
Metal furniture	82	30	28

** Formerly on straight piece-work incentive plan.*

Q. How much can I expect to save with incentives, and how much will the workers benefit?
A. This table shows the gain in production, percent savings (of direct labor costs), and increased employee earnings, and is a random sample of actual installations made by Geo H Elliott and Co, management consultants



DIE ASSEMBLY is placed on movable table of cart, raised against top plate, and parts are clamped



DIE OPENS EASILY when movable table is lowered. Tools, bolts, and nuts are kept on lower plate of cart

DIESET "TAKE-APART" CART

J G SCHLINDWEIN, Tool Supervisor, LYON METAL PRODUCTS, INC. AURORA, ILL

Damage to punches and piercing and blanking dies when separating dieset assemblies has been eliminated by construction of a "take-apart" cart at the Aurora, Ill, plant of Lyon Metal Products, Inc.

With the cart, one diemaker can separate a dieset and move the components to his bench in less than half the time formerly needed by two men with conventional methods. Also, he does the job with less effort and greater safety.

The cart, originally a standard die truck, was converted by mounting a fixed 28 x 40-in. steel plate above the elevating table, supporting it with 26-in. lengths of 1-in. pipe and ¾-in. tie-bolts, and providing T-slots for clamps.

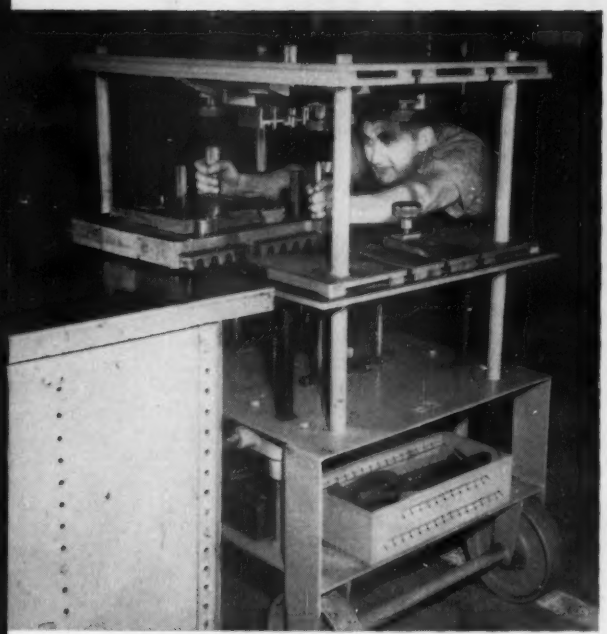
Height of the fixed table was determined both by the shut height of the dies and by the opening needed between the tables to allow clearance between opened assemblies at workbench height.

If desirable, conventional die carts can move dies to and from the punch-press department, keeping the "take-apart" cart in the toolroom and available to diemakers.

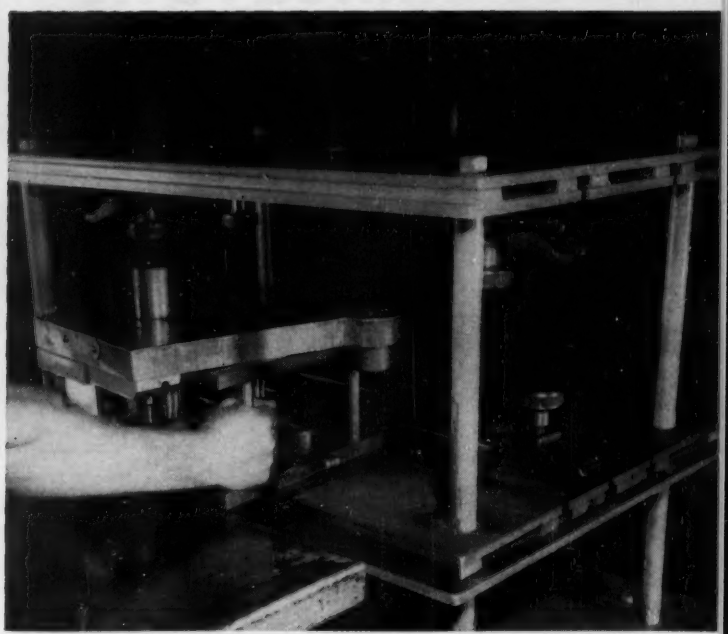
A dieset to be separated is placed on the elevating table of the cart and raised against the top plate. If the punch holder has a shank for clamping to the pressram, it is centered in a clearance hole in the fixed top plate. Then die-shoe clamps and T-bolts with quick-acting knurled nuts lock the punch and die-holder shoes to the tables. Lowering the movable table separates the assembly.

Any combination of T-slots can be used on the faces of the tables, for clamp bolts. One cart has two T-slots in each of the tables; another has two in the fixed table, three in the elevating table. T-slots are provided by supporting ½-in. CRS plates with ½ x 1½-in. CRS spacers, the assembly being joined to the mild-steel tables with hardened socket-head screws and dowels.

Diemakers also find these carts helpful in lining up small perforating punches and die inserts in a dieset, and for trying out small bending and forming dies when the tryout press is busy with another job.

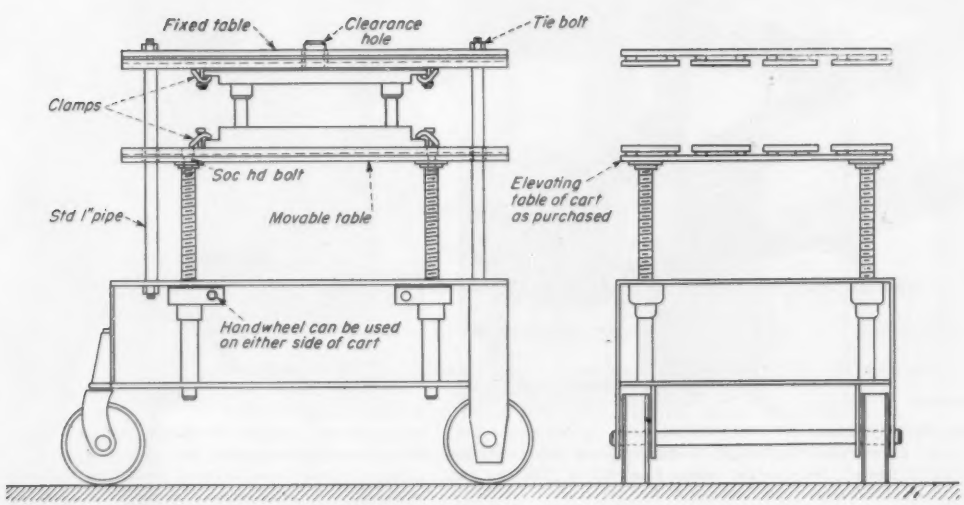


WITH MOVABLE TABLE of cart aligned with top of workbench, diemaker loosens lower clamps and pushes die assembly onto bench



PUNCH ASSEMBLY, supported on parallels to clear punches, is moved onto bench

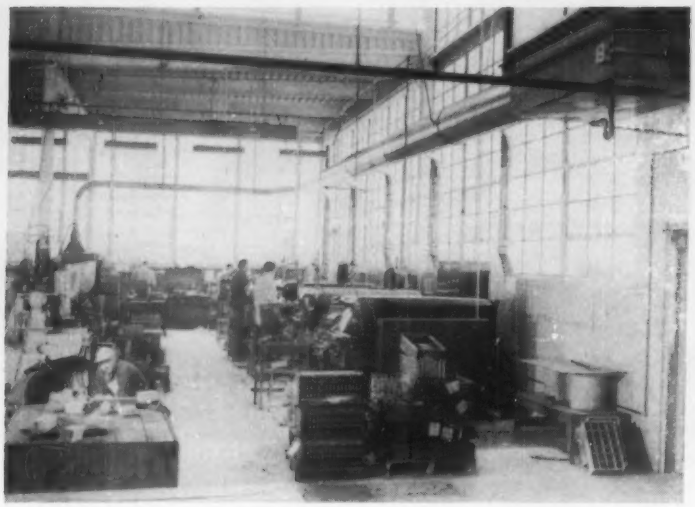
SAVES TIME, CUTS DIE DAMAGE



CART WAS ADAPTED from standard Barrett-Cravens elevating-table die truck. Conversion cost about $100 for labor and materials. Capacity is about 300 lb. Plates must be parallel, to prevent binding

save oil... save heat... save money

Here's dollars-and-cents proof that in a misty location an electrostatic air cleaner can pay off in a short time. It reclaims oil, it reduces heat loss in winter, and it keeps the working force much happier with the atmosphere in the plant

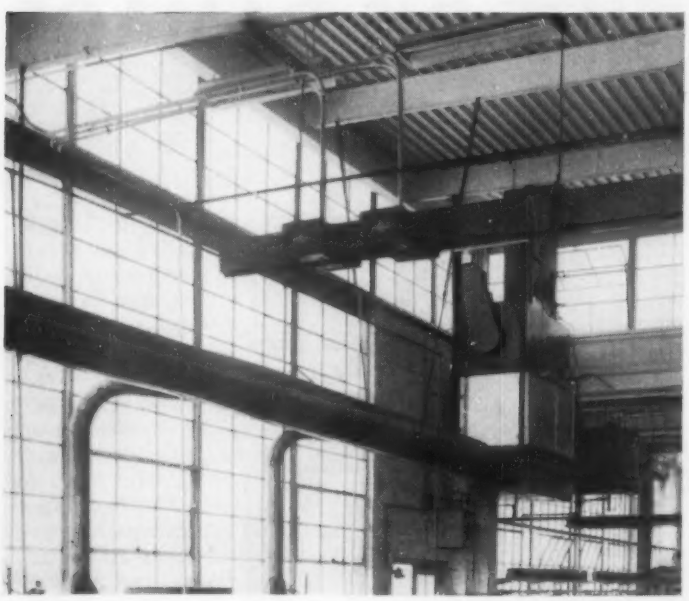


SIX EX-CELL-O THREAD GRINDERS at Richard Brothers Div, Allied Products Co, Hillsdale, Mich, produce oil mist that obscured vision and covered equipment and parts with a film. Original blower-collector unit had low capacity for exhausting, and wasted heated air in winter

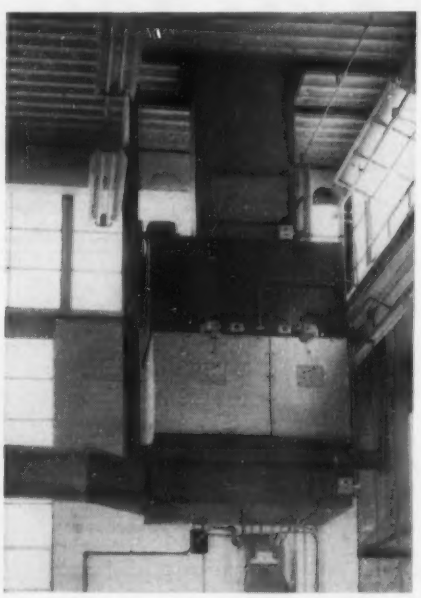
WHY THE NEW UNIT SAVES MONEY:

16450 cfm must be exhausted to obtain a clean atmosphere in the thread-grinder area. If this were dissipated in winter, heat losses would amount to 1,320,000 btu per hr. Heating oil is purchased at $0.0833 per gal., and contains 152,000 btu per gal. Assuming 50% efficiency, this would take 17.4 gph at a cost of $.5340 per degree-day. The Detroit area has 6580 degree-days in an average heating season, so cost of the heat lost by dissipating the air would be $3553.

About 0.95 gal. of cutting oil, at $0.426 per gal., is recovered . . . a total saving of $140 per year. Cost of the installation was $3397 for the cleaning unit plus $1720 for ductwork and the like. At a total cost of $5117, the installation will pay off in 17 months.



NEW UNIT IS A 5000-CFM VERTICAL-FLOW PRECIPITRON made by Sturtevant Div, Westinghouse Electric Corp. Exhaust line increases in diameter toward unit as feeder lines come in (see also photo above). Main header carries from 400 to 1200 cfm per machine at constant velocity of 2900 fpm



INSTALLATION IS CLOSE TO CEILING, out of the way. Damper is closed in photo, but can be opened in winter to allow recirculation of heated air. Results of change are better morale, lower cleaning bills, savings of $3553 yearly in fuel oil and $140 in cutting oil

American Machinist
SPECIAL REPORT
NUMBER 355

it's time to adopt

REALISTIC DEPRECIATION RATES

to win the battle for modernization

BURNHAM FINNEY, EDITOR

Replacement of obsolete production equipment in America's metalworking shops has been retarded by the Treasury Department's insistence upon spreading out tax depreciation over 15-25 years. Congress should pass legislation without delay to correct this situation by allowing manufacturers to recover much more quickly their investments in new machines. Speedier writeoffs will act as a spur to modernization

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OPTIONAL DEPRECIATION...

will do most good

Federal tax depreciation rates on new production equipment are totally unrealistic today.

They act as a brake upon investments in new machines. They have no relationship whatever to the equipment's service life. They encourage manufacturers to retain in use old machines long after they have become obsolete and thereby hamper the installation of cost-reducing programs by metalworking manufacturers.

Congress should revise drastically the prevailing depreciation policy to permit investors in new equipment to recover their capital much more rapidly than the Treasury Department now allows.

Not until such action is taken will we get ourselves out of our unenviable position of having the world's most backward depreciation policy.

Congress should pass legislation giving manufacturers the option of choosing their own depreciation rates. But once a rate has been elected, the taxpayer must stay with it and not change it to suit the whims of the moment.

With due consideration for federal revenues, it may be necessary to impose one limitation upon the free choice of a depreciation rate—not more than 50% can be written off during the first year of use.

Optional depreciation would do the most good in stimulating management to keep its plant in the best possible condition. It has been used effectively in Sweden and, with modifications, was the basis of our depreciation policy prior to 1934.

The US Internal Revenue Service has clung through the years to the straight-line method of depreciation of capital equipment. This means that if a machine is to be depreciated over a period of 20 years, the taxpayer must adhere strictly to a 5% deduction from the original cost every year for 20 years. The allowance is the same the first year as in the twentieth year.

This straight-line method is about as unrealistic as a tax plan can be. Every user of a new machine knows that depreciation is far greater the first few years than later on, just as it is on an automobile.

The only sensible thing to do is to abandon the straight-line method and substitute a plan whereby a substantial percentage of the investment can be written off during the early years. One proposal is to adopt the declining-balance method which has been employed extensively abroad Another is to allow a specified large percentage to be deducted the first few years (say 20% each year) and in the later years revert to straight-line, smaller-percentage write-offs.

The declining-balance method, by the way, calls for depreciating a machine costing $10,000, let us say, 10% the first year, or $1000. The second year the 10% rate is applied against $9000 instead of against the original $10,000. The third year the 10% rate is assessed against the unamortized balance ($8100).

The Internal Revenue Service has based its depreciation rates since 1934 upon the "useful life" of a machine. "Useful life" means that an engine lathe supposedly, and arbitrarily, has a life of 25 years. Depreciation rates, as a result, are stretched out to absurd lengths, without regard for obsolescence or the fact that a machine may be thoroughly "beat up" long before the revenue people's slide rule says that it has lost its usefulness. The "use-

what Congress should do about depreciation . . .

1 . . Allow manufacturers to set their own depreciation rates on new production equipment. But once a rate is adopted, it should not be changed. Maximum permissible write-off the first year: 50%.

2 . . Permit manufacturers to depreciate new equipment at a higher rate the first few years than later on. Either the declining-balance method could be used or an arbitrary deductible percentage specified, with a liberal percentage allowed.

3 . . Abandon the "useful life" theory as a basis for setting depreciation rates.

4 . . Eliminate Bulletin F of the Internal Revenue Service as a criterion for determining depreciation rates.

5 . . Put the burden of proof on the Internal Revenue Service for determining a taxpayer to be wrong in his deductions for depreciation.

ful life" theory should be abandoned completely for the good of the national economy.

Some 20 years ago the Internal Revenue Service, then the Internal Revenue Bureau, brought into being Bulletin F. It was to be a guide for Internal Revenue agents in setting write-off rates on new machines. Bulletin F established the "useful life" for different types of production equipment, including machine tools. Instead of being regarded as a guide, Bulletin F became the agents' bible. There is neither rhyme nor reason to the ages arbitrarily assigned to certain machines in Bulletin F. Hence, for the good of everybody, Bulletin F should be assigned to oblivion along with the "useful life" theory.

The Internal Revenue Service has had the prerogative of naming the depreciation rates on new production equipment. If the manufacturer did not like the rates, he had the burden of proving them inequitable. Congress should write into new legislation the provision that the taxpayer be given the right to set his own rates. If the Internal Revenue Service disapproves of the rates chosen, it then must show them to be inequitable.

Liberalization of the nation's tax depreciation policy on new production equipment is to the selfish interests of industry, to be sure. But it also is in the national interest; and that is why *American Machinist* is advocating it.

The owner of a machine is not relieved of his tax burden as a result of a faster write-off. The burden merely is shifted from one set of circumstances to another. Suppose a machine is fully depreciated for tax purposes in seven years. From that time on the owner no longer can deduct any depreciation on that machine as a part of his operating expense. Instead the taxable earnings of the business

increase and the government gets taxable revenue in a different way.

If a manufacturer is spurred by fast depreciation rates to replace his old machine at an earlier date than heretofore, he then would start paying taxes on the new machine.

The federal government, if it puts into effect more rapid depreciation rates, will not lose any tax revenue in the long run. The White House subscribes to this point of view, as indicated in President Eisenhower's budget message submitted to Congress in late January, 1954. The President said:

"Faster depreciation will merely shift the tax deductions from later to earlier years. It will not increase total deductions. The change should, in fact, increase government revenues over the years because of the stimulation it will give to enterprise and expansion."

The Eisenhower administration, as the Presidential quotation confirms, subscribes to a complete revision of the present antiquated policy. It has recommended to Congress a liberalization of depreciation policy along these lines:

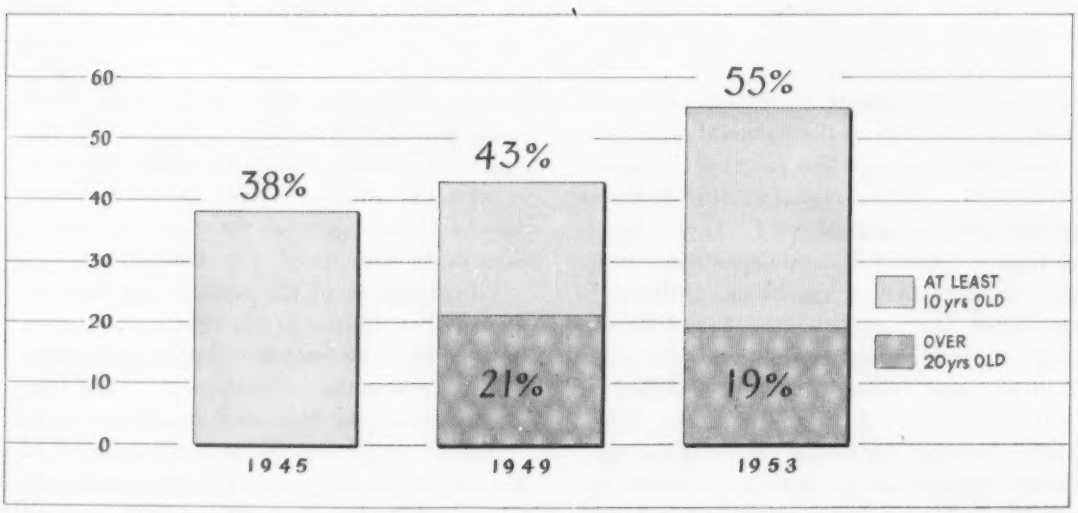
1. Taxpayers may use the declining-balance method of write-offs. They will be permitted to deduct each year twice the percentage allowed under the straight-line method (taking Bulletin F's "useful life" for each type of machine as the base). But the percentage would be applied each year to the unamortized balance rather than to the original cost.

2. When machines are used after the end of their estimated useful life, depreciation charges would continue.

3. Taxpayers may use any other method of depreciation they desire so long as write-offs do not exceed those obtainable from the proposed declining-balance method.

4. The new tax depreciation policy would become effective on all production equipment installed after January 1, 1954.

The practical results of the administration's program would be to achieve part of the objective for which industry has been battling for years. The write-offs would be relatively high in the early years. About two-thirds of the cost of new equipment would be written off during the first half of the life of a machine.



UNREALISTIC DEPRECIATION RATES HELP PROMOTE OBSOLESCENCE

America's machine tools are much older, on the average, today than in 1949 or 1945, American Machinist's latest Inventory of Metalworking Production Equipment reveals. The average age should be reduced if American industry is to achieve low-cost production. Replacement of old machines by new ones will be stimulated by a depreciation policy in keeping with actual depreciation of equipment. That means much faster write-offs than are now permitted.

President Eisenhower urges depreciation tax reform . . .

A liberalization of the tax treatment of depreciation would have far-reaching effects on all business and be especially helpful in the expansion of small business . . . At present buildings, equipment and machinery usually are written off uniformly over their estimated useful lives.

The deductions allowed, especially in the early years, are often below the actual depreciation. This discourages long-range investment on which the risks cannot be clearly foreseen. It discourages the early replacement of old equipment with new and improved equipment. And it makes it more difficult to secure financing for capital investment, particularly for small business organizations.

I recommend that the tax treatment of depreciation be substantially changed to reduce these restrictions on new investment, which provides a basis for economic growth, increased production, and improved standards of living. It will help the manufacturer in buying new machinery and the storekeeper in expanding and modernizing his establishment. It will help the farmer get new equipment. All this means many more jobs.

— from President Eisenhower's budget message to Congress, January 21, 1954

While the administration's plan is a commendable start toward a realistic depreciation policy, it does not go far enough. Perhaps at this time it is not feasible, in view of the delicacy of the national budget situation, to go "whole-hog" and grant complete optional depreciation to industry. But that still should be the goal toward which to move.

There is essentially no difference, except in degree, between the program advocated by the administration and *American Machinist's* proposal for optional depreciation. The White House plan puts legal arbitrary limits on how fast a manufacturer can write off a machine, regardless of its actual service life. *American Machinist* would go beyond that. It would leave to the judgment of the manufacturer the rate at which he should amortize his investment for tax purposes. If he has acquired high-production equipment which will pay for itself in four years and he wants to get back his caiptal investment in that period, he can do so without the necessity of spending a lot of

time and money trying to convince the Internal Revenue Service that they should approve his action.

The truth is that if manufacturers suddenly were confronted with the problem of choosing their own time cycle in depreciating their new equipment, there would be no rush to write off machines in a one-to-five year period. It is a good guess that the percentage of companies wanting to depreciate their machines in five years or less would be surprisingly small.

Surveys that have been made to ascertain the time cycle for depreciation have shown that manufacturers in general probably would choose a 10-year period on the average. But the point is that if the economics of a situation make obvious the advantages of a speedy write-off, a taxpayer could proceed without having the burden of proof on him and without getting into a long wrangle with the Internal Revenue Service and even then run the risk of coming out of the controversy with an adverse ruling.

Are short-term write-offs permissible today? To be sure, they are. But they are few and far between. Only a manufacturer with extensive resources, an iron-clad case, and the patience and courage to fight can hope to get the Internal Revenue Service's blessing for them.

George Terborgh, research director of the Machinery and Allied Products Institute, declares that the depreciation policy now in operation is "pseudo-scientific" and has "deprived business management of reasonable discretion in the fixing of depreciation rates and precipitated a welter of controversy and litigation."

It has been a dangerous deterrent to the replacement of old equipment with new in that it has encouraged the financial side of management to look askance at proposed new-machinery investments as long as a machine is on the company's books not fully depreciated. It is true that a company is not compelled to use the same set of accounts for its own purposes as it must for taxes. But as a practical matter, most manufacturers, especially the smaller ones, do not like to keep two sets of books. Like it or not, the depreciation rates allowable for tax purposes tend to become the rates used in the business.

The low depreciation allowances are a powerful influence in retarding modernization of shop equipment on yet another score. Almost all manufacturers earmark their depreciation allowances to go into a depreciation reserve which is drawn upon for the purchase of new equipment. These reserves are a big source for funds for expansion and modernization of machinery facilities. They probably account for one-third to one-half of US capital expenditures.

Bear in mind that the economy is traditionally healthy and prosperous when the outlay for new plant and equipment is at a high level. Conversely, the economy suffers when

depreciation allowances fall short by $7 billion a year

The depreciation presently permitted American business for federal tax purposes falls short by $7 billion a year of a realistic allowance for current capital consumption. No responsible person, whether businessman or statesman, can contemplate with equanimity the taxation of this much capital recovery as income. It is not only inequitable; it constitutes a dangerous drain on the capital funds available for the replenishment and improvement of our productive capacity. It is a drag on progress in an era when our world responsibilities, not to mention our own self-advancement, call for all the progress we can achieve. Reform of tax depreciation must stand high on the agenda of public policy.

William J. Kelly, president of the Machinery and Allied Products Institute, in the foreword to the forthcoming book on "Realistic Depreciation Policy" by George Terborgh, MAPI research director

OTHER NATIONS PERMIT FAST WRITEOFFS

Sweden...

Manufacturers had the right to choose whatever depreciation rates they wanted in the period from 1938 to 1951. They could charge off 100% of the cost in the first year, if they so chose. They also had the privilege of changing their rates from year to year.

This plan was first proposed by Swedish industry. The Socialist government accepted it, wanting to encourage industry to keep its physical plant modern and its costs down. Result: Swedish factories today are in very good physical condition and are equipped with modern machines.

In 1952 and 1953, as a result of shortages and of inflation stemming from the Korean situation, the annual maximum depreciation allowance was restricted to 20% and, in some cases, allowances had to be temporarily deferred. Sweden is expected, however, to return soon to a policy of unlimited depreciation allowances.

Switzerland...

Manufacturers may choose between an annual depreciation allowance of 25% of the undepreciated cost of a machine or an allowance based on the straight-line method, which is one-half or two-thirds of the declining balance rate. Depreciation allowances for Canton taxes (as compared with federal taxes) are substantially higher.

United Kingdom...

Manufacturers were granted an initial allowance of 20% of the cost of equipment the first year, during the 1946-1949 period. This allowance was raised to 40% from 1949-1951. Such initial allowances were then discontinued by the Finance Act of 1951. In April 1953 the Chancellor of the Exchequer proposed reinstatement of the initial allowance of 20%. Aside from the first-year feature, Britain's depreciation policy gives the taxpayer the right to choose beween the declining-balance and straight-line methods. Basic rates are set for various classes of items. A percentage of this rate may be applied, using the declining-balance method, to the undepreciated cost of the item.

Canada...

A liberal declining-balance policy was put into effect in 1948, with a maximum annual rate of 20%. In addition "accelerated depreciation" was allowed on facilities certified as essential to defense beginning in 1951. At the same time an Order in Council required deferment of allowances for machinery for non-defense projects (to alleviate materials shortages and ease a tight labor market). This deferment order was terminated at the end of 1952 and today a liberal declining-balance policy again is in operation.

France...

Basic depreciation rates are 10-15% a year, the same as they were before the war. After the war the aircraft, automobile and certain other metalworking industries were accorded special depreciation rates as follows: (1) 15% on machines working 2500 hr per year, or one shift; (2) 20% on machines working 4000 hr per year, or two shifts and (3) 30% on machines working 6000 hr per year, or three shifts.

India...

A special write-off of 20% is allowed the first year on new or rebuilt machines. Thereafter the rates are 10% of the depreciated value annually for single-shift operations, or 15% for double shifts.

a tax policy discourages such investments and the nation's production equipment, on the average, increases in age and becomes more obsolete year by year.

Strangely enough, the tax depreciation policy that has been in force since 1934 was preceded by a policy that closely resembled the one which *American Machinist* now is championing. For many years manufacturers were permitted to select whatever rates they wished. If the Internal Revenue people thought the rate unreasonable, they had to prove their case. As a result of this policy, the rates voluntarily chosen by industry averaged around 10 years.

Since 1934 it has been a different story, however. The government, then pinched badly for revenue in the midst of the great depression, made an about-face in its depreciation tax policy. The rules that were imposed to meet a temporary situation became frozen into a permanent pattern that has not changed right up to 1954.

It is time now to make another about-face, the opposite of that made 20 years ago. It is time that America caught up with the rest of the democratic world in adopting an enlightened and constructive depreciation policy. Britain, Canada, Sweden, France and Switzerland are among the countries that recognize the high economic value of permitting generous write-offs in the early years of ownership of production equipment. America's allowances are the skimpiest of all.

The Eisenhower administration, in its espousal of a more liberal depreciation policy, is on the right track and deserves encouragement and support. The sole weakness in its program is that it does not go far enough. It grants to manufacturers only limited leeway in recovering their capital investments.

American Machinist urges members of Congress to go beyond the White House proposal and write into new legislation the policy of permitting industry to select its own timetable of depreciation. Only the manufacturer involved, and certainly not the Internal Revenue Service, is in a sufficiently well-informed position to be able to make the most intelligent decision as to how long a period is the most practical in which to depreciate production equipment for tax purposes.

In adopting optional depreciation, Congress will perform a national service. A truly liberal depreciation program will spur replacement of old equipment with new. Capital investments will be encouraged (surveys indicate that industry will loosen its purse-strings if it can write off new equipment more rapidly than now). And, as already acknowledged by the White House, government revenues will profit, not suffer, in the long run.

Realistic depreciation rates will go a long way toward turning the tide in the battle for modernization of America's metalworking industries. Congress should act without delay to legalize optional depreciation and thereby make it the law of the land.

Two MAPI Recommendations

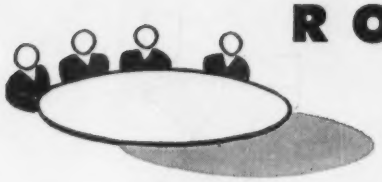
The Machinery and Allied Products Institute recommends that: 1) Taxpayers be authorized to take a double-rate declining-balance writeoff as an alternative to the present system; and 2) they be permitted to blow original-cost book values to their equivalent in current dollars, an official set of multipliers being provided.

If the first of the two recommendations were in full effect on all business assets at the beginning of 1954, and if expenditures on new assets rise thereafter from the 1953 level at a rate of 3% a year (compounded), the excess of the resulting depreciation over the allowable depreciation under the present system would be, for a few selected years:

1954	$6.2 billion
1960	$4.5 billion
1965	$3.8 billion

If the effects of both recommendations are measured together, the following increases in depreciation would take place, compared with today's total:

1954	$11.3 billion
1960	$ 7.3 billion
1965	$ 5.6 billion



ROUND TABLE

Suggestions or Extractions?

"I hear you're giving your boys a hard time about the Suggestion Plan, Ed. Have you talked to Harrison about their beef?"

"Not yet Al; besides, *they're* the ones who are giving *me* a hard time. What makes you think we should pay extra just to get toolmakers to do their regular work?"

"Well, what makes you think you should penalize toolmakers just because they're more skilled and have better imaginations than the average guys in the plant? I think you should pay your men for any suggestions they dream up—just like you'd pay a production worker."

"That's what the boys claim, Al, but they're wrong. After all, what point is there in putting them through a long apprenticeship at company expense if the company can't collect dividends on their work afterward? I think they ought to be damned glad to get premium wages."

"Look, Ed. The company pays those boys premium wages for their skill and knowledge—what they can do as a regular thing. But you can't expect to take the product of their imagination and ingenuity and not give them something extra for it; particularly when you pay the other men extra for the same kind of extra brain work."

"But the other men aren't expected to think up money-saving ideas, Al. There's the difference in men—and in wages. A toolmaker is supposed to be able to solve a difficult problem. That's why we hire him."

"You're partly right, Ed; but when the problem is actually one that should have been solved by the engineering department or the master mechanic, and a toolmaker goes ahead and takes care of it; there he's done a lot more than his job requires, and I think you should let him put the idea in on the Suggestion Plan and get paid for it."

"Next thing you know a toolmaker will expect a bonus for sharpening his own tool. This thing has gone too far, Al. We've got to draw the line between regular responsibility and extra effort somewhere, and I think this is the place."

"If you do you'll find that the toolmakers will quit trying to do anything out of the ordinary, Ed; and that'll cost you a lot of good tooling."

***SHOULD A TOOLMAKER** be paid a bonus, via Suggestion Plan, for ideas he thinks up to improve production? Or is this really part of his job? Is denying a toolmaker the right to a suggestion plan a dangerous limit on his initiative? Your ideas on this subject may be of interest to others. Discussions of earlier topics appear on later pages.*

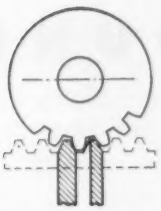


FIG . . 1

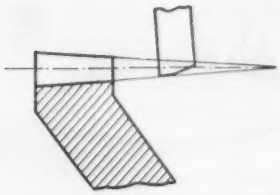


FIG . . 2

Shaper attachment generates bevel gears

For job-shop quantities of bevel gears, the combination of a standard universal dividing head and a rotary table plus this formula will fill the bill

HAIM MURRO, BAYONNE, NJ

Fundamentally, gear generation is a process wherein a gear is produced from a blank by utilizing a gear-shaped cutting tool. The gear blank and the tool are held in a relative position and rotated as if they were in actual mesh. Simultaneously, the tool is reciprocated along the face of the blank. Thus, correctly shaped teeth are "generated" in the blank, teeth which will perfectly mesh with those of the tool-gear or with any other gear or rack of the same tooth series. In the same way, a rack can be used to generate a gear if, at the time of cutting, the relative movement of the cutter rack and the gear blank is truly along the pitch lines of both rack and blank. This cutter is easily made because, like a rack, it contains only straight lines. Further to simplify the job, only one tooth of the rack is used as a tool and it generates but one tooth spacing at a time. The simplest form is a spur gear.

Bevel gears are generated by the same principle. However, because the bevel gear form is the frustum of a cone, the tool is restricted to generating only one side of the tooth space at a time. Also, the tool must be sufficiently narrow to conform with the small-end tooth spacing and pass through it. The bottom point on the generating side *must* reciprocate on a line passing through the apex point (Figs 2 and 11). After one side of each of the teeth in the gear has been generated, the tool is offset so that the other point passes through the apex and the other side of each tooth is generated, to complete the gear.

In rolling, the pitch cone will rotate around its own axis, as well as around the perpendicular line to the plane at the apex point. This compound motion will have a fixed ratio for a given cone, depending upon the cone angle. Where "r" is the radius of the cone base, "R" is the length of the cone side, "N_a" is the number of revolutions of cone around the perpendicular axis and "N_b" is the number of revolutions of the cone around its own axis, then from Figs. 3 and 4:

$\frac{N_a}{N_b} = \frac{r}{R}$ and $\frac{r}{R} = \sin \alpha$, where α is one-half of the cone angle. By substitution: $\frac{N_a}{N_b} = \sin \alpha$

Hence the setup for generating must clamp the gear blank, then provide the compound rotation and the ratio of the axes adjustable to a range of gears having different cones within the capacity of the setup. In addition, it should permit indexing to the number of teeth on the gear as well as setting the blank at its pitch-cone angle.

Universal dividing head mounted on a rotary table and having change gears between the two, to establish the desired ratio of rotations and thus conform with the particular pitch-cone angle of the gear blank, fulfills this setup, Figs. 5 to 7.

While each attachment should be designed to fit the particular dividing head used, and the range of gears desired, the device described here may serve as a design guide.

A baseplate, having a side plate at 90°, contains an integral stud (threaded-in or welded). A rotary plate pivots on the stud and is retained by a worm wheel segment, anchored to the stud by a key, and which in turn is retained by a nut. The stud is centrally bored to hold a stem. In the baseplate are three mounting slots through which are passed T-bolts for clamping to the shaper-table sides. Angular graduations on the baseplate simplify mounting it to the shaper table. The rotary plate holds a worm, which meshes with the wheel segment, and is mounted on a shaft rotatable in two bearings. At right angles to the worm shaft, another shaft is bevel-geared to it. When a crank-handle on the latter shaft is turned it rotates the worm, which rotates the rotary table on the baseplate.

The dividing head is mounted on the rotary plate, positioned by the slot in the plate. A gear train connects the input shaft of the head

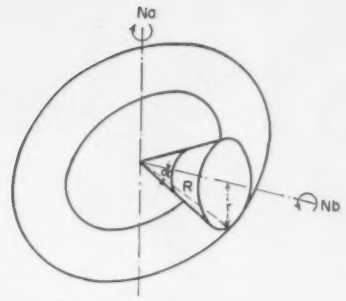


FIG. . 3

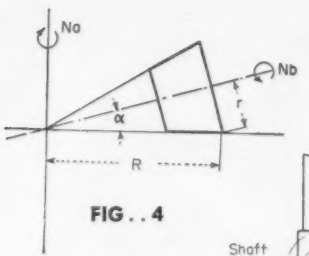


FIG. . 4

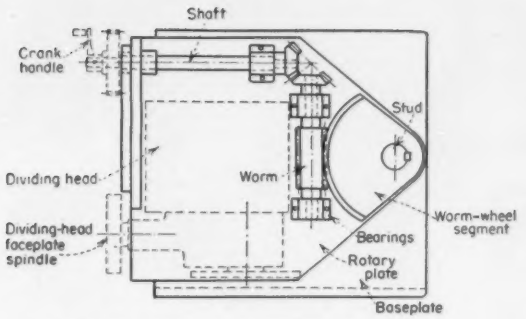


FIG. . 5

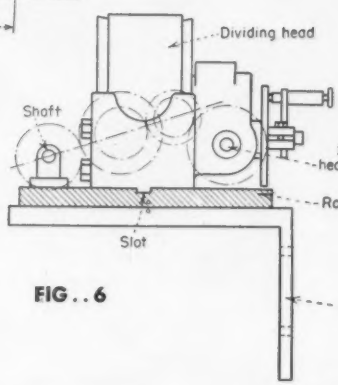


FIG. . 6

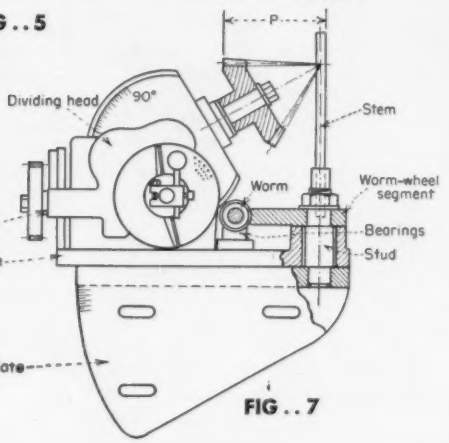


FIG. . 7

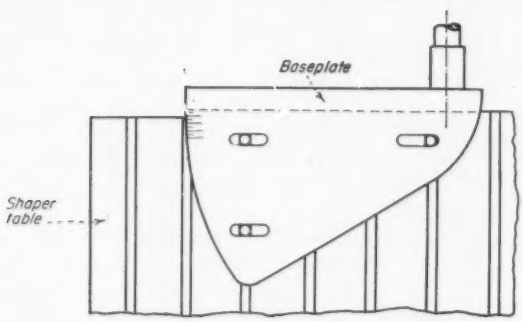


FIG. . 8

FIG. . 9

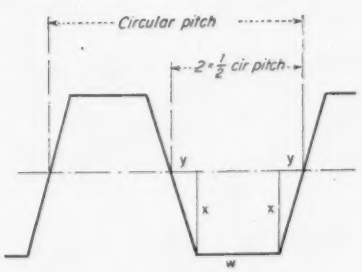


FIG. . 10

to the input shaft of the rotary table. Thus, a ratio can be established to give compound movement.

SETUP PROCEDURE

1. Clamp the attachment to the side of the shaper table, after setting it at an angle equal to the dedendum angle of the gear to be generated. This setting positions the tooth base-line parallel to the tool travel.

2. Tilt the dividing head to an angle equal to one-half of the pitch angle of the gear to be generated.

3. Mount the gear blank on an arbor on the tilted dividing head and move the blank along the arbor so that the apex point will locate above the exact center of the rotary table. Use the stem to measure dimension "P", which should be the apex distance (side length of pitch cone) plus one-half of stem diameter. This measurement is readily taken with a caliper if the edge cone is machined to an angle which is complementary to that of the pitch cone, as it provides a "side" parallel with the stem. For setup and tooth measurement use this edge cone angle, then machine the specified edge on the finished gear after all of the teeth have been generated.

4. Select and mount the change gears to suit the desired gear. As previously shown, the ratio between the rotary table and the

dividing head spindle should be:

$$\frac{N_s}{N_b} = \sin \alpha$$

The same ratio must be established between the two input shafts, provided that the reduction on both of them, by internal gearing, is the same. In this case: $\frac{N_b}{N_m} = \sin \alpha$

If the reductions differ, the constant of the device C, is introduced and the formula is: $\frac{N_b}{N_m} = C \sin \alpha$

For example, if the dividing head has a 40:1 ratio from input shaft to spindle and the rotary table has an 80:1 ratio from input shaft to table, $C = \frac{80:1}{40:1} = 2$. Thus, the formula for this arrangement is

$$\frac{N_b}{N_m} = 2 \sin \alpha$$

5. Prepare the cutting tool to the pressure angle used on the gear (Fig. 9). The bottom width of the tool must not exceed the bottom width of the tool spacing at the small end of the gear. This bottom width (W) for any diametral pitch tooth is calculated by using a rack of the same tooth size (Fig. 10):

$$W = z - 2y$$

$$y = x \tan \beta$$

$$z = \frac{\text{circular pitch}}{2} = \frac{3.14}{2\ (\text{dia pitch}}$$

$$x = \frac{1.57}{\text{dia pitch}}$$

$$W = \frac{1.57 - 2.314 \tan \beta}{\text{dia pitch}}$$

$$\text{For } 20^\circ \text{ system } W = \frac{0.63 \text{ in.}}{\text{dia pitch}}$$

$$\text{For } 14\tfrac{1}{2}^\circ \text{ system } W = \frac{0.97 \text{ in.}}{\text{dia pitch}}$$

Approximation is sufficient for this calculation, as the result shows maximum tool width, which should be narrowed.

A gage is useful for tool preparation. Its "V" is used to check the tool angle and the width markings indicate the desired bottom width. Different gages are used for the 20° and 14½° pressure angle systems.

6. Clamp the tool in the toolpost, vertically, and with the corner of the tool on the generating side directly above the centerline of the rotary table. Use the gage to check position and alignment against the stem.

For centralizing, the shaper table is shifted, then clamped in position. *The table should only be moved again when centralizing the other corner to cut the opposite tooth face.*

7. Raise the shaper table to the desired working level. Adjust the stroke and position of the ram to suit the job.

8. Lower the tool slide so that the tool just touches the highest point on the blank. Then, with the ram stationary, lower the tool slide an amount equal to the full tooth depth at the large end of the gear.

9. Swing the rotary table to the side, by turning the crank handle, so that the tool will completely lose contact with the gear blank, as the tool reciprocates.

10. Slowly jog the rotary table back into center position. Use the same handle for feeding, which is done each time the tool leaves the blank on the return stroke. Feeding is continued until the tool again loses contact with the blank with the rotary table swung to the opposite side. (Designers may incorporate a ratchet mechanism on the shaft to replace manual feeding. This mechanism can be operated from the original shaper feed crank.) Operation can be speeded if the blank has some of the tooth spacings removed by milling prior to mounting it for generating. This will leave the cutting tool of the shaper less material to remove. Milling can be done by a milling cutter having the same form as the tool, with the same bottom width, or with a circular saw having the same width.

11. Index the blank after finishing one tooth spacing by the indexing handle of the dividing head, and generate the second tooth.

12. Move the shaper table horizontally after one side of each of the teeth has been generated, to bring the other point of the tool above center.

13. Generate the first tooth, removing as little material as possible to produce a "thick" tooth. The chordal thickness of the tooth is measured with a gear tooth caliper. The amount it should be "reduced" is calculated, and the gear is indexed by a small amount that can be calculated, which will bring about the desired reduction when the same tooth is generated again. (Do not "reduce" the thickness by horizontally moving the shaper table). Check the chordal thickness again, and if correct all of the other teeth can be finished by regular indexing.

The gears generated on this attachment, when care is taken, can be put to use as they come from the machine. Sometimes it is desirable to have the gears run for a short while (1 or 2 hours) with abrasive paste, so the miniature steps produced by the reciprocating tool are smoothed out.

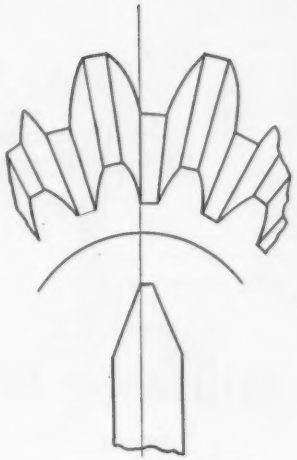


FIG . . 11

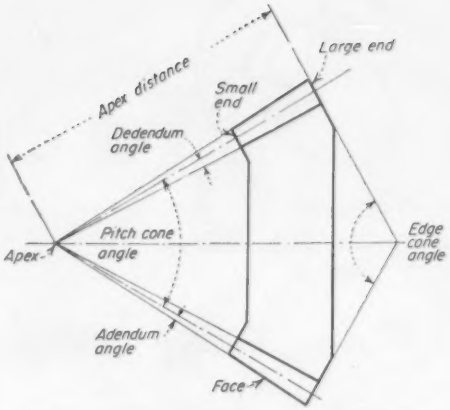
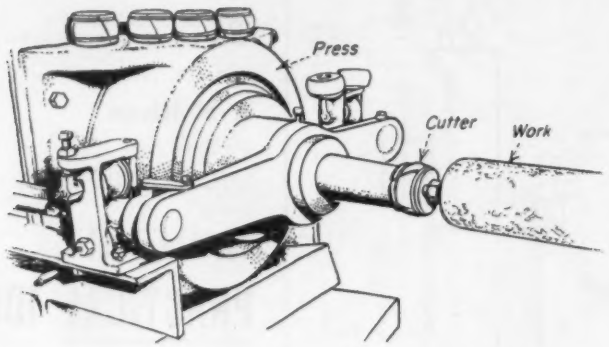
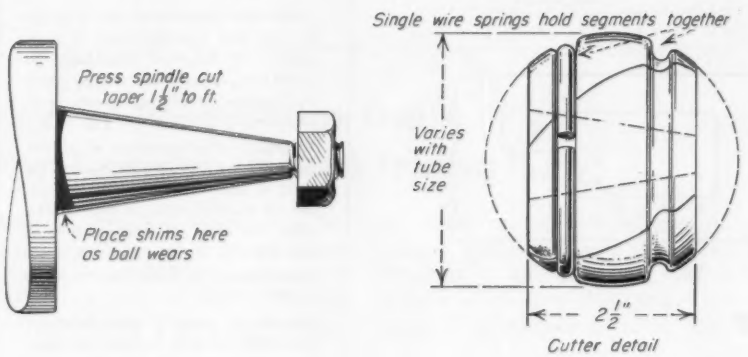


FIG . . 12

Practical Ideas




Press spindle cut taper 1½" to ft.
Place shims here as ball wears
Single wire springs hold segments together
Varies with tube size
2½"
Cutter detail

Rebuilt 50-Ton Press Burnishes Axle Housings

Considerable time and effort have been saved by converting a 50-ton press to burnish the inside of axle housings at Standard Forge and Axle Co, Montgomery, Ala. Conventional method would be to bore the hole for axle spindles, which would require considerable handling and tooling.

What was done instead was to redesign and reconstruct an old press, design and make a number of arbors, for different tube sizes, and make a series of burnishing tools to fit the arbors. To make the burnishing tools, the middle 2½ in. of a steel ball was cut (on a spiral, to avoid marks on the bore of the holes), taper-bored, and fit on the tapered arbor. The resulting tool is then pressed into the tube, burnishing the bore.

Variations of ID of the rough, heat-treated tubing is – 1/16 in. to + 1/32 in., so that as much as 3/32 in. ID increase may be necessary to reach the finished size.

When the hole is burnished, the burnishing tool is removed and the axle spindle is put in place and pressed on, using the same press.

As the tool wears, shims can be placed under the tool, to bring the resulting hole to correct size.

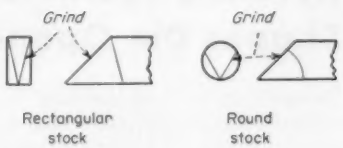
This method of work also checks the tubes for flaws, which show up as cracks in the surface of the axle housing when the tool passes the flaw. *E Dalton White, Atlanta, Ga*

Sandwich Helps Drill Semicircular Holes

In our maintenance shop we were asked to produce a semicircular cutout in the edge of pieces of flat iron, so the workpieces would fit a 1 7/16-in. shaft, with the center of the hole about ⅜ in. outside the material.

Because we have no adequate milling machine, I decided to use a drillpress. Two packages of 8 pieces of flat iron were clamped to the drillpress table with a ¾ x 2 in. insert between them. The insert had a hole predrilled to guide the 1 7/16-in. drill. The whole package clamped together acted as a solid.

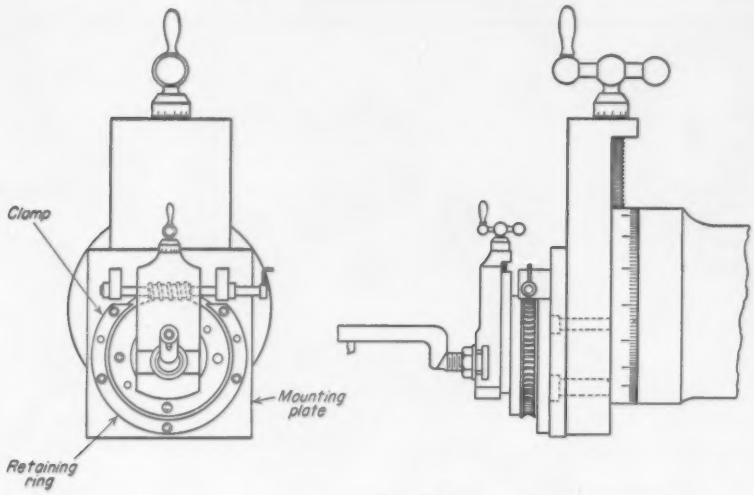
It is important to note that the insert must be of material very similar to the workpiece, for smooth drilling. *F Mernieks, Oakville, Ont*



Titanium Scriber Marks Lines On Glass

Titanium, zirconium, and certain other alloys can be shaped as shown and the resulting tool will be useful for marking lines on glass, such as might be needed on dials, grids, lettering, numerals, and the like.

The metal scribers have a characteristic chemical reaction, when so used, which deposits a silvery line on the glass. It should be noted that the line so made cannot be removed except by grinding, so caution should be exercised that the lines will be correct the first time. The softer grades of glass take lines more easily, but some pressure must be exerted on all glass. *J. M. Heath, Kenmore, NY*



Rotating Toolholder Shapes Die Openings

To speed up work on blanking dies, we built this attachment which acts as a substitute for a vertical shaper.

The clapper box was removed from a conventional shaper, and, in its place, secured a mounting plate with special screws threaded into the tool slide. A wormwheel and lower plate were centered on a plug, and secured wih screws and dowels. The upper plate was bored to slip over the hub.

The wormwheel was bored out to take the shank of a compound slide barrowed from a bench lathe. This slide was secured with two plugs and two setscrews, just as on the lathe. The plugs locked against the tapered shank. A stepped retaining ring was screwed and dowelled to the mounting plate. The driving worm was mounted on the plate, shown, the worm being mounted with as little backlash as possible.

A number of toolholders were made, some straight, and some with welded offsets, as shown, which permit small radii to be generated. To generate large radii, the toolholder can be rotated 180°, and the toolbit reversed.

A sample die opening is shown, with the sequence of operations used to shape it to size after bandsawing. The vertical feed on the shaper is set at 45°, and the compound is set to swing the tool on a ½-in. radius. The tool is set at point A, and the cross feed used to feed to point B. The compound is then rotated 45°, to point C. The toolslide feeds up to point D. The compound is backed up 1½ in., so it will swing a 1-in. convex radius, and the tool is reset at point E, the compound rotated 235°, and so on. Careful planning before starting cutting will save work. We usually shape the die-opening at 90°, then add relief by contour-filing. *Henry Gifford, Bronx, NY*

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An extra payment of $25 is made for the best Practical Idea in each number of *American Machinist*. To avoid bias, the selection will be made by readers, a different group each time.

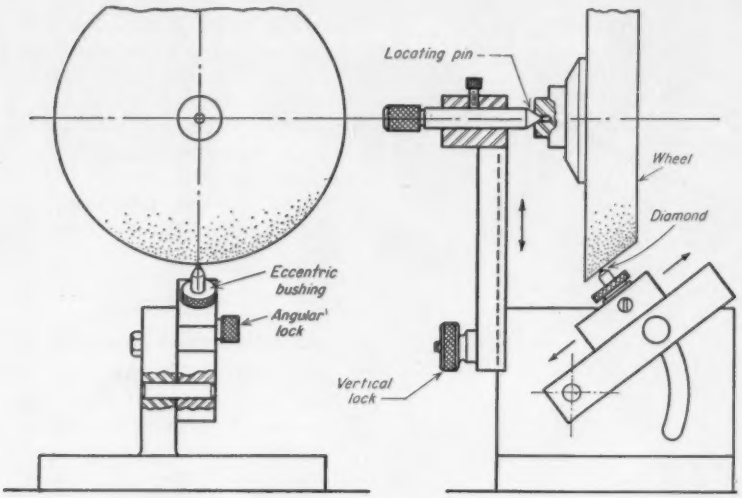
PAYMENT—$25 in addition to regular rates for the item as published, to be paid as soon as reader votes are received—usually three to four weeks after the date of issue. The winner will also be announced in these pages as soon thereafter as practicable.

JUDGES—A group of 200 *American Machinist* readers is asked to select preferred articles in each issue. The group is a true cross-section of all readers, and changes entirely each time. Their votes, in addition to guiding the editors, select the best Practical Idea. If at any time their votes result in a tie, $25 will be paid to each and every co-winner. Decision of the readers will be final in each case.

REQUIREMENTS—Only items in the Practical Ideas pages are eligible, and they must be submitted directly by the originator. Do not worry about your shortcomings as a draftsman, photographer or author—every item will be edited in accordance with *American Machinist* standards and suitable illustrative or explanatory material added where needed. Readers will judge only the finished product—in terms of its usefulness to them.

WHO MAY ENTER — Anyone may enter except employees of the McGraw-Hill Publishing Co, Inc, and those of advertising agencies or departments. Suggest to your employees that they submit ideas.

HOW TO ENTER—Send your entry to "Practical Ideas Editor," American Machinist, 330 West 42nd St, New York 36, N. Y.

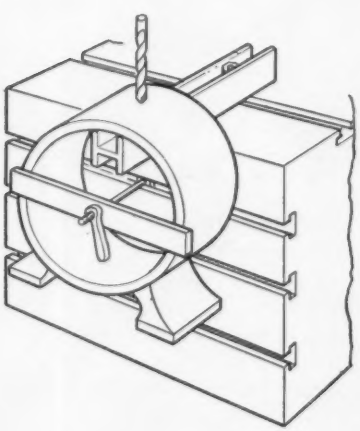


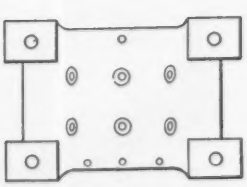
Center Positioning Gage For Angular Wheel-Truing

With the attached center-hole locator, the diamond on this angular wheel-truing device can be set to cut on the exact vertical centerline of the grinding wheel. Many similar angle-truing devices do not have an effective way tc make this adjustment, and machinists have to use makeshift methods to set the diamond in correct position. Unless the diamond is set on center, the angle on the wheel will not be the same angle to which the device has been set.

To operate the gage, lower the vertical adjustment bar to bring the point of the center hole locator into alignment with the diamond. The diamond may be adjusted left or right by rotating the eccentric bushing into which it is locked.

Then raise the vertical adjustment bar and locate the 60° point of the hardened center hole locator in the center hole of the grinding wheel arbor. The diamond is now in the exact vertical line of the grinding wheel. Remove the vertical adjustment bar, and the wheel can be trued by sliding the diamond-holder block across the grinding wheel. *H J Gerber, Stillwater, Okla*





H-Beam Supports Yokes For Easy Drilling

We have found that a simple and inexpensive method for drilling and spotfacing holes in field magnet yokes and other circular parts is to support the part over an H-beam of appropriate size, which has been clamped to the drillpress table. The beam projects over the end of the table just far enough to reach the far edge of the work, and the supporting edges of the beam are rounded and lightly greased. (Our beam is 6 x 5 in., and typical work weighs about 100 lb.)

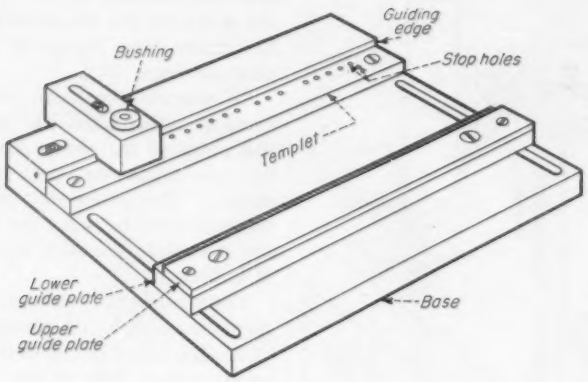
A strap across the face of the yoke holds work in place, and the operator simply loosens the strap and revolves the work by hand to "index" to a new position for drilling. This is easy with the fine-edge contact between beam and yoke. *A V Hogg, Sunderland, England*

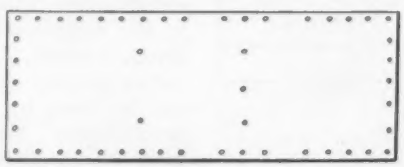
Output Shaft Of Differential Controls Speed From 0 To 300 RPM

We had to test-drive a mechanism at speeds from 0 to 300 rpm, and couldn't get a motor we could control over this range of speeds. To get around this trouble, we took two motors running in opposite directions at 1200 rpm, and, by feeding the motors into a differential, had a net rpm of 0. Gradually slowing one motor to 900 rpm gave us the required spread of speeds. *Chris Stougaard, Racine, Wis*

Eccentric-Driven Gearless Multiple Drillhead

A recent Practical Idea, *AM* —Feb 1 '54, describes an eccentric-driven, gearless multiple drillhead. There is one important detail that was not mentioned in the article. There must be at least *three* eccentric cranks in order to function properly. One can be a dummy crank, and needs no provision for trust. *Elof B Olson, Chicago, Ill*





Typical workpiece

Interchangeable Templets Diversify Drill Jig

Building small-scale models of various engines and machines often requires making only a single piece, or a pair of mating right- and left-hand parts. Often, though, parts may run into dozens or even hundreds. When only one or two pieces are to be made, it doesn't pay to make a drill jig, but, in larger quantities, we have saved considerable time with the drill jig shown here. Although we make small-scale models, the principle of this drill jig can be (and is being) applied to parts as large as a railroad car (full-size).

An example of the work we do is the end plate at the top of each end of a hopper car. The plates must mate with the sloping bottom plate of the hopper car, as well as with vertical corner angles, Z-bars, and other parts of the car. Practically all drilling for the car can be done on one jig assembly, only the templets, and occasionally the bushings, being changed.

To lay out the templet, a line is scribed parallel to the guiding edge of the templet, and holes are drilled at required intervals. It makes more accurate results to measure each hole from the first locating hole, to avoid tolerance buildup. The first hole must be laid out at a distance from the guiding edge to the distance between the edge of the work and the center line of the holes. This is the clearance hole for the drill. The remainder of the holes are simply locating holes for stop pins.

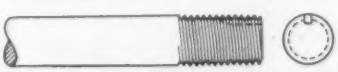
When using the drill jig, the work is placed under the drill bushing, and a stop pin is put in the first locating hole. A second stop pin may be placed in the second locating hole, and we find that such a pin speeds work. As the first pin is removed, the work is slid up to contact the second stop pin, and the first pin is placed in the third hole, ready for use.

If a different series of holes is needed, another templet can be made, to replace the templet shown The drill bushing moves in or out to get the correct centerline distance for holes, and the upper and lower guide plates can be slid back and forth to accommodate different widths of work.

Although this is a model-builders' jig, the same method is used in at least one shop to drill full-size railroad cars and crane rails. *Laurence H Austin, Butler, Penna*

Jack Removes Arbors From Drill Chucks

A recent Practical Idea, *AM* —Dec 21, '53, described a screw-jack for removing mandrels from drill chucks. We had the same problem, and, instead of drilling a hole in each mandrel, we drilled a hole in each chuck. Some chucks have hardened bodies, but, in this case, the manufacturer keeps the center of the chuck body soft, which permits drilling through. After drilling, it is very easy to open the chuck fully, and push the mandrel out with an arbor press, using a bar to reach down through the chuck. *Henry George, Bronx, NY*



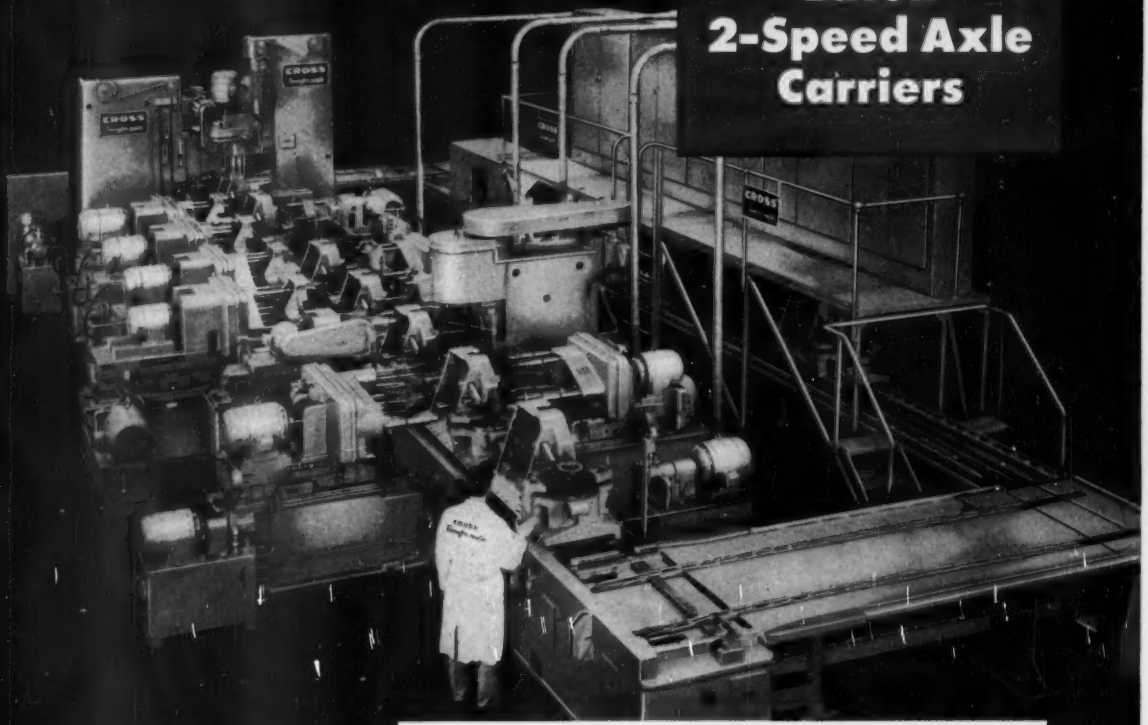
Slot In Thread Cleans Bolts

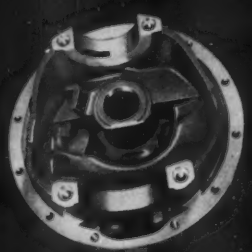
"Furniture" bolts on our planers, drillpresses, and milling machines had to be removed quite often, to take out dirt, grease, chips, and other foreign matter. We remedied this by sawing or milling a small slot in the end of the bolt, similar to that found on thread gages.

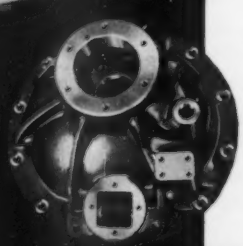
This tended to keep the threads neat and clean, saving operator time and prolonging bolt life. We also found that it saved trouble to be sure that matching bolts and nuts were kept together in pairs. *C L Martin, Lennoxville, Quebec*

Another Transfer-matic by Cross

Mills, Drills and Taps Eaton 2-Speed Axle Carriers







- ★ 53 parts per hour at 100% efficiency—capacity for spiral bevel or hypoid style carriers.
- ★ 97 operations: 60 drilling, chamfering and reaming; 5 milling; 4 spotfacing and counterboring; 28 tapping.
- ★ 9 stations: 1 loading, 1 unloading, 7 machining.
- ★ Two-position, progressive type work holding fixtures with automatic transfer from station to station and integral conveyor for automatic return from unloading to loading station.
- ★ Cleaning unit for removing chips from fixtures between unloading and loading station.
- ★ Other features: Complete interchangeability of all standard and special parts for easy maintenance; construction to J.I.C. standards; hardened and ground ways; hydraulic feed and rapid traverse; individual lead screw feed for tapping; coolant system; automatic lubrication.

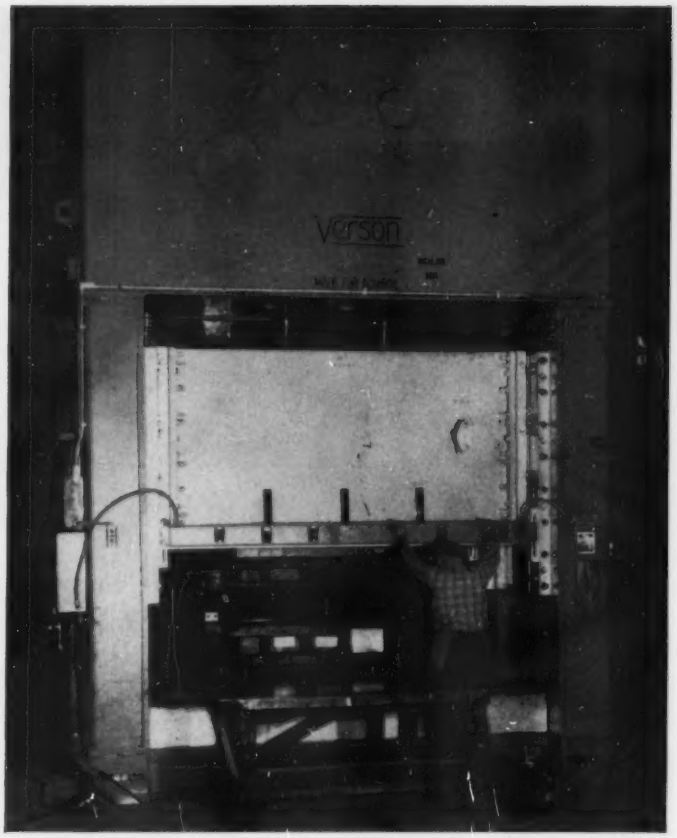
Established 1898

THE CROSS CO.

DETROIT 7, MICHIGAN

Special MACHINE TOOLS

MADE FOR ADMIRAL



THIS Verson FULL ECCENTRIC PRESS produces refrigerator doors

AT Admiral Corporation's Midwest Manufacturing Division in Galesburg, Illinois, all heavy press and press brake equipment is of Verson manufacture, especially for Admiral. The press illustrated above is typical—a 600-ton Verson full eccentric with two points of power application to produce large pieces such as the refrigerator door shown. Other full eccentrics in the Verson line-up at Admiral range from 200 tons to 600 tons capacity.

For all types of forming of large or small pieces for ranges, refrigerators, freezers, space heaters or what have you, Verson full eccentrics provide the five essentials of press design—strength, rigidity, endurance, accuracy and power. For the user of our presses, it means better stampings at lower overall cost.

Whatever you produce that requires stampings—it will pay you to find out what we can offer you. For recommendations, send an outline of your requirements.

A Verson Press for every job from 60 tons up.

Verson

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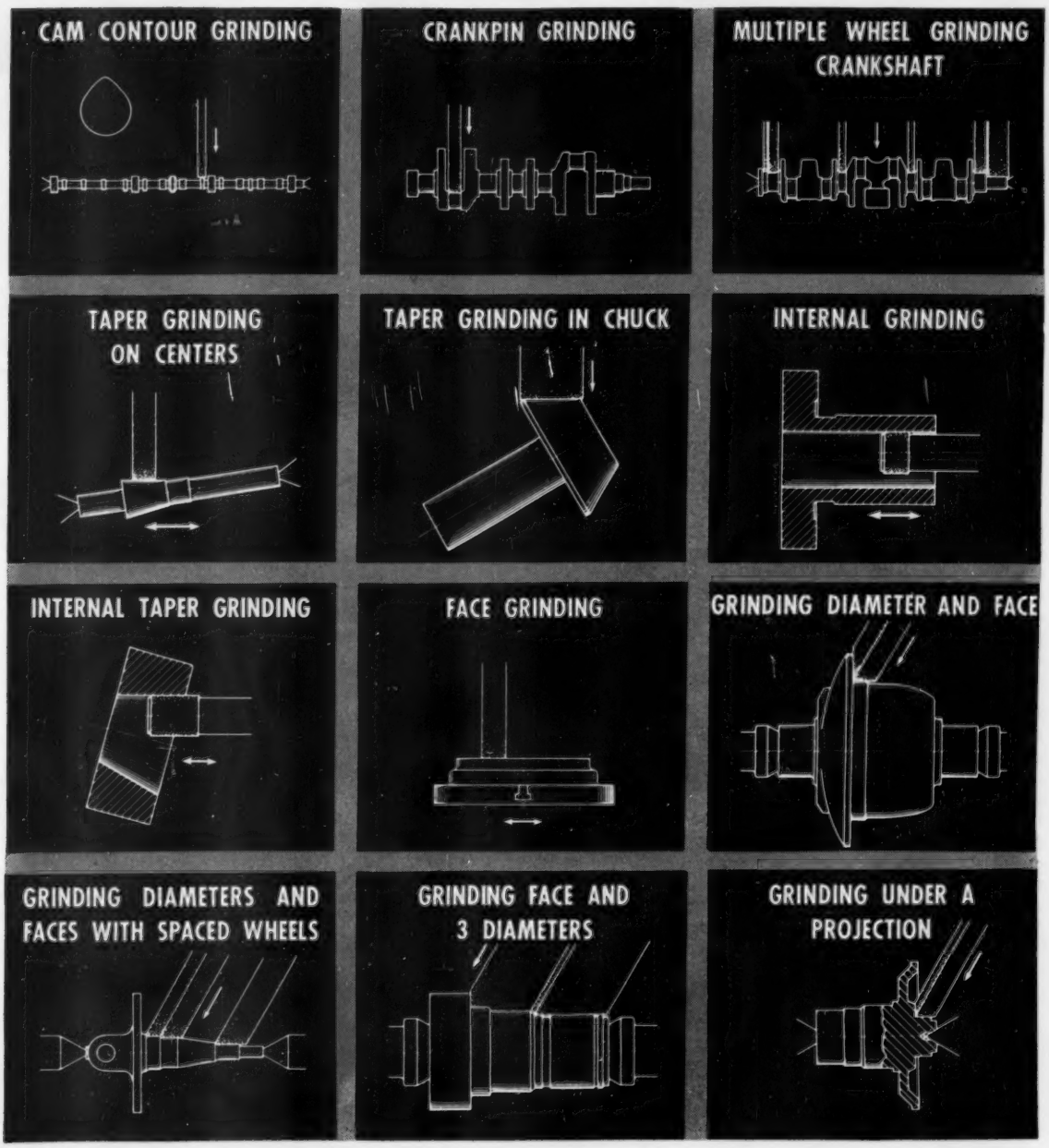
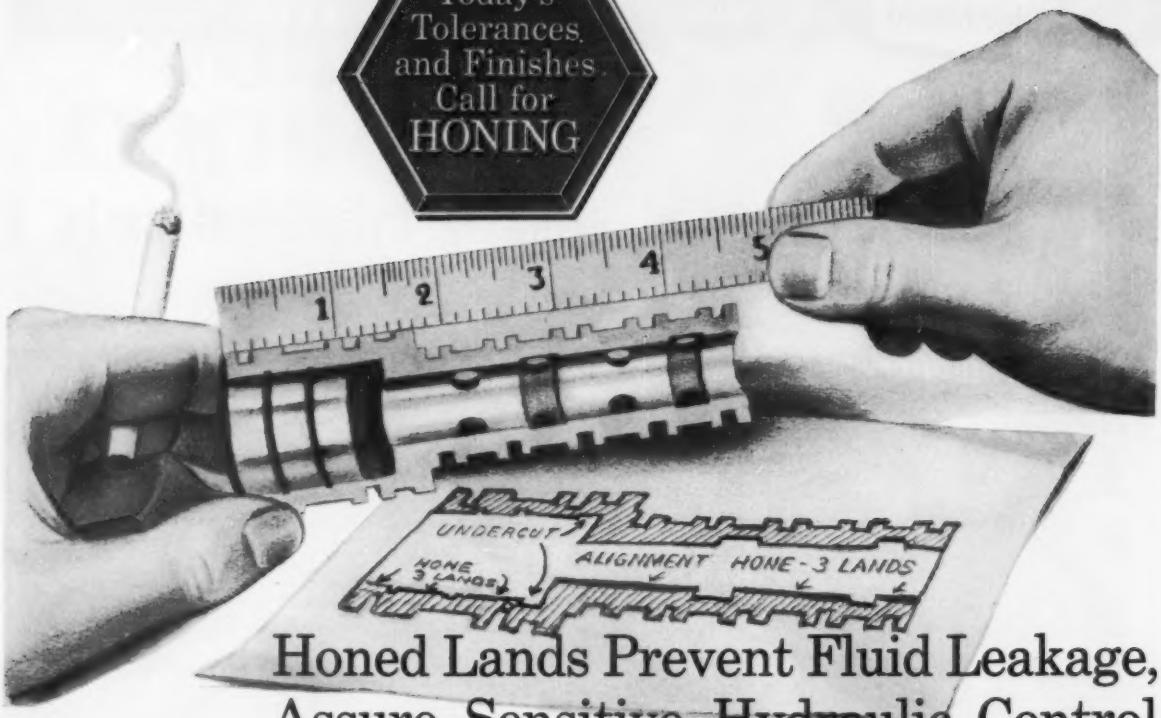
Methods of grinding cylindrical parts...I

COURTESY LANDIS TOOL COMPANY



Today's Tolerances and Finishes Call for HONING



Honed Lands Prevent Fluid Leakage, Assure Sensitive Hydraulic Control

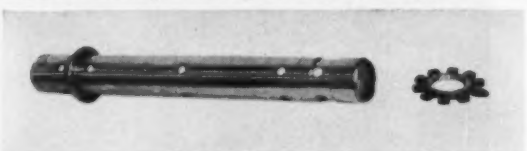
Sunnen Honing Produces Exact Alignment... Eliminates Geometric Inaccuracies... Avoids Port Washout

PROBLEM: The holes in this Meehanite valve sleeve at Village Gage Company have tolerances of .0005″ on the 1.125″ diameter (a blind hole), and .0002″ on the .6255″ diameter. Surface finish must be 2-6 micro-inches RMS. Lands must be perfectly aligned. These specifications assure sensitive, positive response to hydraulic control settings, without pressure drop or leakage.

SOLUTION: Using a Sunnen Honing Machine, the production department now removes .003″ stock and produces parts with speed and accuracy that could not be obtained by lapping, grinding, or other honing methods. The rate—including both holes—is thirty complete parts per hour. This control sleeve now meets their quality standards, and the company has gained a competitive edge through lowered production costs. As a result they have purchased another Sunnen Honing Machine for their plant.

HONING MAY BE YOUR ANSWER TOO...

as it is on this valve sleeve. In both large and small plants, Sunnen Honing has proved to be a practical cost-reducing method for the production of improved bores for sliding, rotating, or reciprocating parts.



From wafer thin parts to extremely long inside diameters, Sunnen Honing Machines handle all shapes and sizes, usually without jigs or fixtures. They hone all metals (except babbit), plastics, ceramics, and glass. Accuracy is guaranteed to within .0001″. Surface finish can be held as low as 2 micro-inches RMS in hardened steel. Diameter range is ⅛″ to 2⅝″.

Average installation is under $1,000—delivered and in operation within 3 weeks. Our field engineers continue to serve you year-'round, without charge. Write for more information.

FREE BOOKLET *shows 105 typical honing jobs—case histories—production rates. Use coupon or post card to get your copy.*

SP-749

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7942 Manchester Ave., St. Louis 17, Mo.

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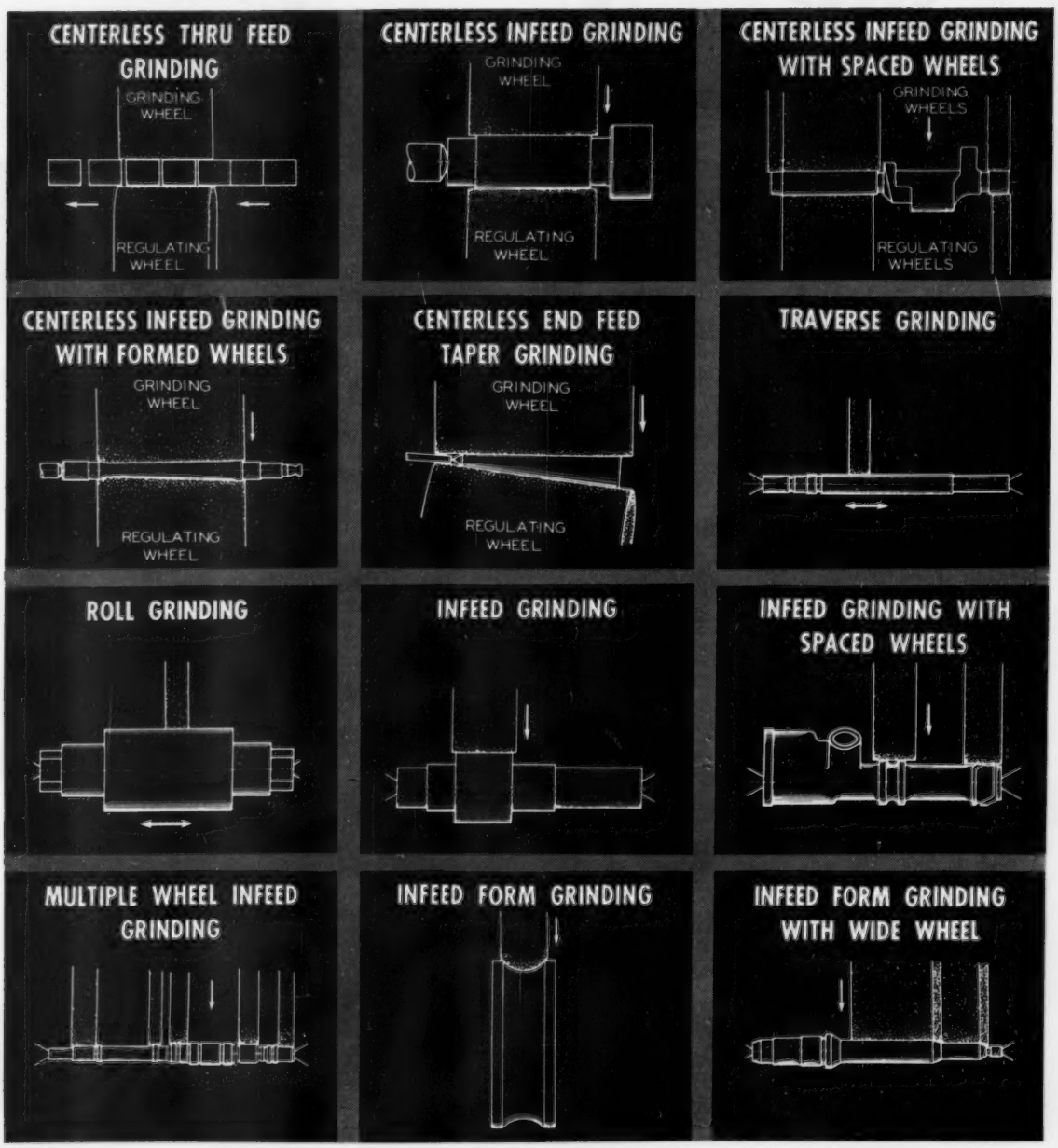
Methods of grinding cylindrical parts...II

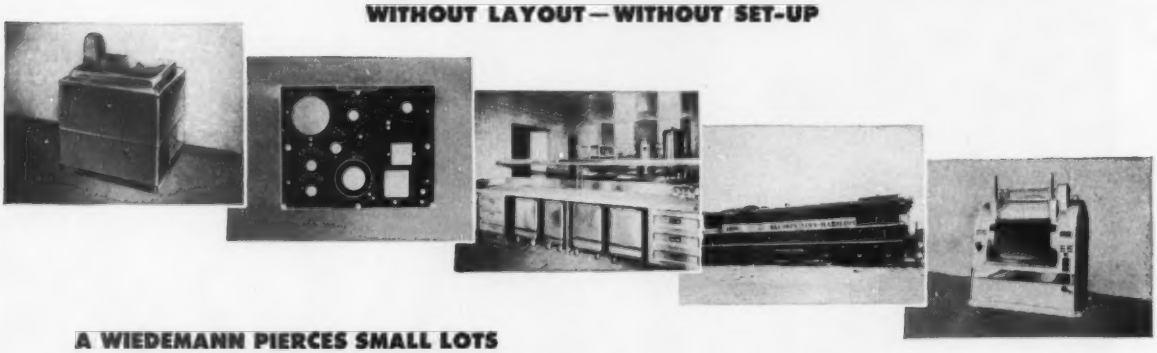


Wiedemann Turret Punch Presses

Pay Off IN TWO YEARS OR LESS . . .
(4000 hours of operation)

precision-pierced parts of these and similar products are produced in small lots with low tooling cost

WITHOUT LAYOUT—WITHOUT SET-UP



A WIEDEMANN PIERCES SMALL LOTS COMPLETE, IN LESS TIME THAN LAYOUT BY CONVENTIONAL METHODS

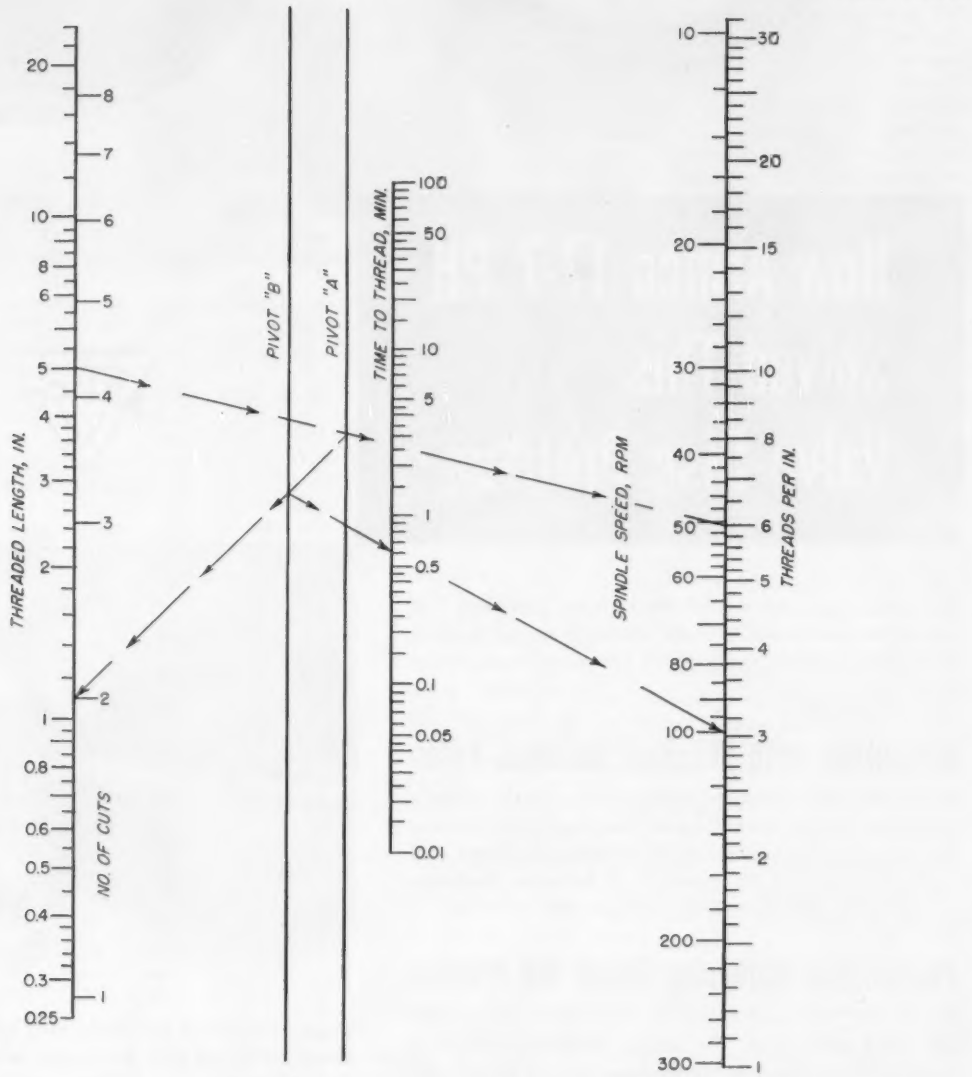
We'll gladly make a time study on your work.

WIEDEMANN MACHINE COMPANY

4217 Wissahickon Avenue, Philadelphia 32, Pa.

Chart for Threading Time

TYLER HICKS



This chart correlates the factors involved in thread-cutting time: thread length, number of threads per inch, number of cuts needed and spindle speed, according to the equation:

$$T = L \times N \times C \div R$$

where T = time to cut thread, min.
L = thread length, in.
N = number of threads per inch
C = number of cuts needed
R = spindle speed, rpm

EXAMPLE: How long will it take to cut a thread 5 in. long with a single-point tool, if the thread is 6 pitch, two cuts are required and the spindle speed is 100 rpm.? Neglect tool-positioning time.

SOLUTION: Enter chart at 5-in. thread length on left-hand scale and draw a line to 6 threads per in. on right-hand scale. From the intersection with pivot line *A*, draw a line to 2 cuts on appropriate scale. From the intersection of this line with pivot line *B* draw a third line to 100 rpm on the spindle-speed scale. Now from the intersection with the time scale, read 0.6 min. as the required time for the operation.

This chart gives the cutting time only. The back-off time of a self-opening diehead may be neglected. With a button die the back-off time is usually one-half the threading time.

How Armco 17-7 PH Solved This Valve-Disc Problem

ARMCO

Four years ago Armco 17-7 PH Stainless Steel was first tried in a manufacturer's check valves. It met all requirements and continues today as the best metal for his valve discs.

Difficulties with Standard Stainless Types

Non-hardenable chromium-nickel stainless steels formerly used often proved too soft—sometimes had to be nitrided. The standard hardenable stainless steels like Types 410 and 420 presented the problems of excessive hardness, cracking and distortion either before or after grinding.

Precipitation-Hardening Solved the Problem

Armco 17-7 PH, in soft condition, blanks and forms readily into these valve discs. The double low-temperature heat treatment then develops the hardness desired without distortion. To attain a hardness of Rockwell C-41 minimum, Armco 17-7 PH is held at 1400 F for 1½ hours, cooled to 60 F, then heated to 950 F for ½ hour and cooled. This treatment produces a 0.2% offset yield strength of 165,000 psi minimum in tension or compression.

Sheets, Strip, Plates and Bars

Armco 17-7 PH is produced in soft condition for double heat treatment in sheets, strip, plates and bars. It is supplied cold-worked for single heat treatment at 900 F in sheets, strip and wire. For further information on this precipitation-hardening stainless steel and its companion grade, Armco 17-4 PH, write for our latest bulletin.

ARMCO STEEL CORPORATION
4583 Curtis Street, Middletown, Ohio
Export: The Armco International Corporation

TALKING SHOP

Indoor Fish Watchers

SECURITY OFFICERS at Minneapolis-Honeywell Regulator Company recently realized that "fishing" for classified data had become too easy and devised an eye-catching way of assuring an "on-guard" attitude on the part of personnel in the ordnance and aeronautical divisions. A series of card mailings, each satirically profiling the nine most flagrant security risks, was sent out. Risks are portrayed as "queer fish" that "never get away" from the skillful angler. Examples: the three-martini worker (ie, the Fried Herring) who discloses any information without request after imbibing; the loquacious employee (Large-Mouthed Bass) who loudly discusses classified information over the telephone; the griper (the Common Carp) who complains incessantly over security regulations, often revealing vital information in the process. In each instance, the card reveals typical leading conversation-starters used by the angler, so that the employee may come to recognize them for what they are.

Honeywell reports results have been excellent. In its ordnance division, a marked decrease in security violations was noted immediately after the mailings began. The Federal Security Agency has expressed keen interest in the series, and the Chicago Ordnance District reproduced the cards for mailings of its own.

Tracers

THE TRACER LATHE, now so popular in Europe, creates a different problem here. Europe has many lathe operators who are actually traditional all-around skilled machinists. We have many who are not. A tracer job must be set up and run by somebody who understands the geometry of the cutting cycle, according to several users. If a poorer-than average lathe operator runs one, he takes too much time on setups, or makes wrong ones, and a good machine tool turns out scrap or highcost parts.

Honeycomb

FIBERGLAS HONEYCOMB, bonded with Alclad on both sides, is being tested by Convair for aircraft structures. Aluminum honeycomb structure has been used on the 240 and 340 *Convair-Liners* for non-structural applications such as flooring and bulkheads, and more recently for primary structures to a limited degree. But the new type reduces heat transmission through the skin, has high strength-weight ratio, is fuel-tight, and cuts out many fabricating operations on bulkheads and stringers.

CO_2 at Work

ONE COMPANY has used CO_2 as the coolant in drilling laminated plastics, grinding molded plastics and armature laminates, in facing aluminum bronze, and in hobbing, facing, milling, turning, grinding and drilling several types of stainless as well as SAE 4140 at R_c 35-42. In general, cutting time has been halved, and tool life increased in some cases. Changes in cutting angles have been found necessary to accompany increased feeds and speeds. Stainless has been machined at 750 sfpm, and hobbed at 533 rpm (fastest speed on the particular make of hobber) with a 1⅞-in. hob. All these have been experimental applications, but production applications are planned.

Oil and Wax

SEEGER REFRIGERATION COMPANY, facing high wear on drills for tough titanium alloys, found a wax lubricant (Johnson's Wax 140) an answer. It increased holes per drill from 3 to 120. This came out in a general discussion among production men that also traced the origin of the use of cocoanut oil as a tapping lubricant. Seems an automatic was on a test job when the coolant system broke down. To keep from burning or breaking the tap, one of the engineers grabbed a squirt can and oiled it. For the first time, the threads were clean and untorn. Turned out the lubricant was cocoanut oil, kept in the squirt can by the operator of a nearby machine to use on his arms. Coolant on his machine caused dermatitis if he didn't precoat his arms with cocoanut oil.

Too Much Safety

COMPLICATED SAFETY DEVICES may defeat their own ends, in the opinion of experienced machine builders. The buyer may specify what seems to be an endless chain of devices planned to cope with every conceivable hazard. Trouble with this attitude is the reliance placed on safety device No. 2 to function if No. 1 fails, and so on down the chain. Maybe one of the links won't be operative just when you are relying upon it. Therefore, without seeming to stand in the way of progress, we raise the question: "Are additional safety devices warranted, over and above the devices customarily used, to the extent of doubling the cost of the machine, and adding an extra mile of wire to connect the many addditional panel boards installed?"

Billet to Bullet

CARBOLOY reports a recent case in which an operator chucked a 5-in. steel forging weighing 40 lb in a 28-in. chuck and started a ¾-in. cut without setting the tailstock. The tool, of new grade 370, flew through the air from a broken toolholder. and the billet itself followed for 30 ft. When properly held and supported, the tool took a 15/16-in cut at 130 sfpm.

News of Metalworking

Army, Navy, Air Force Jockeying for Control Of US Guided Missile Program

WASHINGTON—One day the guided missile will be the key to both US offense and defense. That's why the Pentagon is investing literally billions in guided missiles. In the last four years, about $1 billion has actually been spent on missile procurement, and another $2 billion or so is either available for spending or will be when current budget requests are approved.

$1.5 Billion a Year

A good guess might be that the whole missile program—research, development and procurement—is running at about $1.5 billion per year now. This compares with Air Force spending on aircraft of $9 billion, plus $1 billion for research and development.

The service chiefs know that the one who gets out in front with a missile is almost sure to be top dog at the Pentagon. So all three are pushing missile development as furiously as they can.

Each has a perfectly logical line of reasoning to support his contention that missiles properly belong to him. The Air Force calls them "pilotless bombers"—a logical extension of air power. The Army notes that the ground-to-ground missile is really a new kind of artillery. And the Navy proclaims that missiles dovetail nicely with its carrier and submarine warfare.

This competition has produced a real scramble, with each service chief hot after a decision that would give him a clear stake in the missile field. As of now, the missile in international warfare is for the future. But for inter-Service warfare it's here.

And as of now, the Air Force is out front. It's getting more of the missile money—about $1.25 billion of the $3 billion voted so far. The Air Force has missiles underway in all categories.

The Army comes next with about $1 billion, and Navy third with around $750 million. But as far as the "state of the art" is concerned—and with it the potential to win out—all three Services are about neck-and-neck.

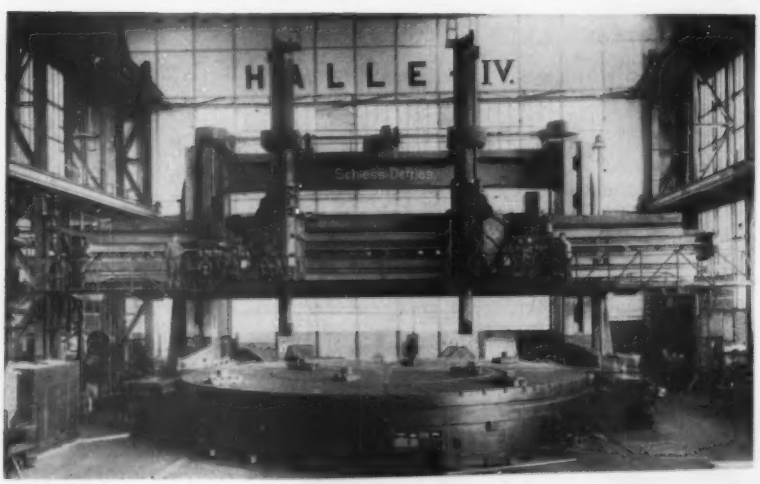
The present missile program is big enough to provide business for almost every airframe and engine maker of any size. There are literally dozens of missiles now being developed.

Several in Development

Some of the big factors are Martin with the "Matador," Chance-Vought with the Navy's "Regulus," Hughes Aircraft with the "Falcon," Convair with the "Terrier," Douglas with the "Sparrow," Bell Aircraft with the "Rascal," and so on. Companies like Fairchild, General Electric, RCA, Bendix, General Mills and Goodyear have had chunks of guidance system contracts. New companies are springing up to build rocket engines, missile components and accessories.

All these companies—with one or two exceptions—are working on a hand-crafted basis. Almost every missile produced is a little bit different—and, they hope, a little bit better—than its predecessor. Mass production, or anything remotely resembling it, is still a long way off. For the time being, the non-aircraft industries don't have a place in the picture.

World's Largest Boring Mill? Germany's



ONE OF FOUR PREWAR SCHIESS-BUILT 59-FT CAPACITY BORING MILLS, this machine was dismantled after the war, had a 21-ft inner table, 40-ft outer table, handled work up to 16-ft high. Similar mill is still in operation

PITTSBURGH—Canada's claim that its 52-ft boring mill at Dominion Engineering Co, Montreal, is the world's largest (*AM* Nov 9/53 p182) has been refuted eight-fold by American Schiess Corp, which claims its parent company, Schiess A G Duesseldorf, Germany, built eight bigger ones before the war. Two of them are still in operation, one in Germany and one somewhere in Russia: the rest are war casualties.

Four 59-Footers Built . . .

Of four 59-ft boring mills (photo at left), one is still in daily use at Voith Co, Heidenheim, Germany. This machine can swing 40 ft with pedestals forward, 60 ft with pedestals back. Outer (40-ft) table can take a 200-ton load, inner takes 100 tons for a total 300-ton maximum load. Inner and outer tables can be driven independently, or tied to-

Tax Amortization Program Winding Up With a Rush, ODM Reports

WASHINGTON—Projects set up under the fast amortization program are starting to reach completion with a rush. At the close of last year, cumulative value of projects in place stood at $20.2 billion. That represented 73.5% of the $27.6 billion worth of facilities certified under the program as of September 30, 1953.

Value of completed projects on September 30—12,237 in number—was $8.7 billion. At that date, 17,005 projects had been certified. Estimated value of completions at the start of this year was $14.3 billion. This year, an additional $10.2 billion is scheduled to be completed; in 1955, about $2 billion; after 1955, another $883.5 million. Omitted from these figures are $1.6 billion worth of facilities certified since September 30, when projects in metalworking industries stood this way:

Status of Projects

- **Total certified** — 1281 projects amounting to $224.3 million.
- **Value in place** — $192 million (85.6% of total industry projects). Estimated value in place on December 31 was $206.5 million.
- **Completed projects**—1036 projects amounting to $124 million.
- **Projects not started**—22 amounting to $3.9 million.

The tax amortization program is definitely petering out. During recent weeks, ODM has received an average 27 applications for fast tax writeoffs weekly, all OK'd.

Expansion Goals

This is reflected in the status of ODM's expansion goals, which form the basis of tax writeoffs. Of the 242 formal goals established, only 90 industries are still eligible.

But you can expect a new spurt in the program. If your company's application has been turned down by ODM in the past because the expansion goal has been filled or closed, you may soon find ODM willing to grant a fast writeoff.

For the first time, ODM is now tabulating the number of certified expansion projects that never got started. Formal tabulation of these may mean new expansion. Every time a certificate is issued, the expansion goal is reduced accordingly. ODM may now allow firms whose applications were denied to take up the slack.

$10-Million Test Plant For Boeing B-52's

LARSON AFB, WASH—a $10-million supplemental production test facility for Boeing B-52 bombers will be built here, Representative Hal Holmes (R, Wash) announced.

Rep Holmes's announcement followed some 18 months' search for a suitable test plant location. Originally, the site was to have been established at Fairchild Air Force Base, near Spokane, but had to be abandoned because nearby mineral deposits "might handicap the delicate instrument calibration phase of the project."

Site Is Federal Property

Boeing President William M Allen said that the test plant site would be federal property, narrowing the location to major air force bases in the Northwest. A number of communities dropped their effort to lure the project to their areas after this statement was made.

800 Technicians to Move In

Some 800 Boeing technicians and their families will be moved into homes near the test site, but not all at one time.

Rep Holmes said recently in Washington, D C, that government funds have already been set aside for the necessary construction. All contracts for the project will be handled by Boeing, he added.

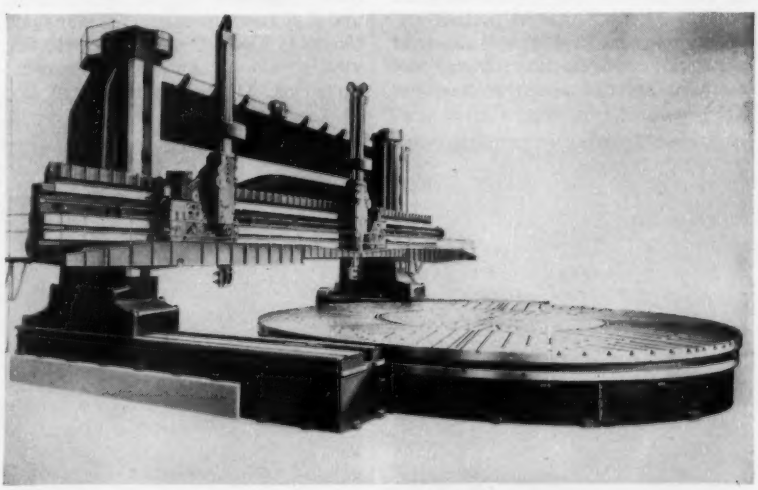
Schiess AG Built It, But Russia Has It

gether and driven as a single table. All Schiess machines utilize power rails rather than fixed rails that must be elevated by cranes.

But Schiess's claims to the world's largest boring mills are reserved for four units it built similar to the one at right. These machines have (or had—only one is in operation, somewhere behind the Iron Curtain—and Russia has another it has evidently never assembled) a 29-ft dia inner table that takes a 220-ton load, and an outer table that takes a 350-ton load, with speeds from 0.05 to 7.0 rpm. And 1600 people can stand on the turntable at one time!

. . . and Four 62-Footers

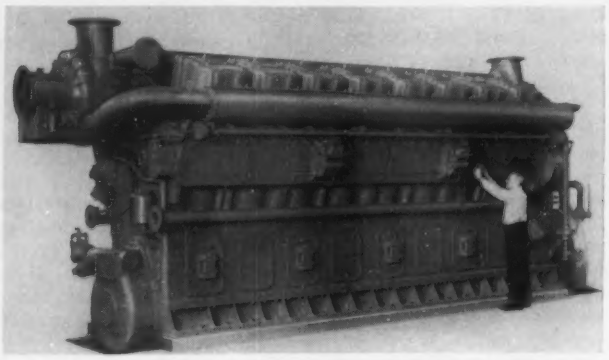
Of the four 62-footers built in 1939-1941, two were shipped to Russia before the war: the other two were damaged heavily in the war and had to be scrapped.



GERMANY CLAIMS THIS IS THE WORLD'S LARGEST. One of four built in 1939-1941, this machine has 62-ft swing with columns in normal forward position, and swing of 83½ in. with columns moved back. Only one is operating—in Russia

Steam Engines—1907 and 1954

TODAY AND YESTERDAY IN STEAM POWER are contrasted graphically by these two photos of Cooper-Bessemer steam engines. Left: 300 handlebar-mustached employees of Rarig Machine Co posed in 1907 on the platforms and ladders of a huge C & G Cooper 2-cyl vertical engine. Below: the modern grandchild of the 1907 engine, an LSV hp Cooper-Bessemer diesel engine that takes up about one-tenth of the space of the old model, yet is just as powerful



Automation, Increased Competition Challenge Cutting Tool Industry, CTMA Meeting Told

DETROIT — Increased competition and the challenge of automation face cutting tool makers in the immediate future. And these in turn will demand greater production and sales efficiency from the industry, Burnham Finney, Editor, *American Machinist*, told members of the Cutting Tool Manufacturers Association in a talk at their annual meeting, held in February at the Lochmoor Club here.

Automation, Mr Finney said, is of particular interest to cutting tool manufacturers because they must not only decide whether to apply it to their own plants—they must produce for all industry the tools without which automatic machinery cannot function.

Wolfe Elected President

At the meeting, Association members elected Robert H Wolfe, president, Arrow Tool & Reamer Co, Detroit, president of the Association, and K R Beardslee, general manager, Carboloy Dept, General Electric Co, vice president; and R S Spencer, president, Detroit Boring Bar Co, treasurer.

Association directors, elected for a three-year term at the meeting are: R G Michell, Eclipse Counterbore Co; L H Skoglund, Scully Jones & Co; and George R Smith, National Broach & Machine Co.

Past presidents of the Association honored by the membership during the annual meeting included E A Goddard of Goddard & Goddard Co, Detroit; D E Van Deusen of Kelly Reamer Co, Cleveland; and Walter F Fuller of Fuller Tool Co, Berkeley, Michigan.

CTMA PRESIDENT
Robert H Wolfe
Arrow Tool & Reamer Co

CTMA VICE PRESIDENT
K R Beardslee
Carboloy Dept, General Electric Co

CTMA TREASURER
R S Spencer
Detroit Boring Bar Co

Ford Meets Plastic Sports Car Challenge With All-Steel Thunderbird

DETROIT—Ford Motor Co's answer to the challenge of Chevrolet's plastic-bodied Corvette is its new Thunderbird, shown for the first time February 20 at the Detroit Automobile Show and scheduled for production next fall.

Unlike the plastic Corvette and the Kaiser Darrin, however, Ford's Thunderbird is of all-steel construction. And, according to L D Crusoe, general manager of the Ford Division, it "is a full-size vehicle—all major parts are interchangeable with our regular line of cars. It is completely engineered and built so that it can be serviced by any Ford Dealer."

1955 Style Harbinger?

That is being interpreted in Detroit as a tipoff to the 1955 styling of Fords, Mercurys and Lincolns. Hood and fender lines, windshield treatment and trim of Ford's regular 1955 lines are likely to resemble those features of the Thunderbird closely.

First clue to Ford's plans to introduce a new sports car was revealed last November by a competitor, L L Colbert, president of Chrysler Corp, who told reporters Ford planned to build 15,000 sports cars in 1955. But Ford spokesmen regard that statement as perhaps too high.

Price of the Thunderbird is not yet set, and won't be until the car is in production. But Ford officials say that it will be "competitive," price-wise with the Corvette, which lists at $3490.

The Thunderbird is powered by a 160-hp Mercury engine. It is equipped with a convertible cloth top that folds completely out of sight into the rear deck. A special composition hardtop is optional, presumably at extra cost.

From a standing start, Ford engineers say, the Thunderbird in 40 seconds will be 53 car lengths out in front of "conventional 1954 cars." Added touch: an adjustable steering column that telescopes in or out 3-in. to accommodate all drivers. Power steering, power brakes, a four-way power seat and power window lifts will be available at extra cost.

Door tops are 33-7-in. from the ground; overall height is 51.5 in.; front tread is 58 in.; overall length is 175.5 in.; wheelbase is 102 in.; curb weight is 2833 lb; road clearance is 5.5 in.

Fluid Power Group To Hold Annual Meeting

EVANSTON, ILL — The newly formed National Fluid Power Association will hold its First Annual Meeting April 5-7 at the Edgewater Gulf Hotel, Edgewater Park, Miss. Program and registration details and information on hotel accommodations are available from Barrett Rogers, Executive Secretary, National Fluid Power Association, 1618 Orrington Ave, Evanston, Ill.

FORD'S NEW ALL-STEEL THUNDERBIRD, priced to compete with the plastic-bodied Chevrolet Corvette and Kaiser Darrin at around $3500, will go into production sometime next fall

WARNER & SWASEY BUYS INDUSTRIAL SCIENTIFIC CO

CLEVELAND—Warner & Swasey Co, machine tool builders of this city, announce the purchase of the Industrial Scientific Co of New York City, and has formed the Warner & Swasey Research Corporation to carry on the work of Industrial Scientific Co in expanded form.

Industrial Scientific produces the Probograph, an instrument that records minute variations in surface contours. The work of the new Warner & Swasey Research Corporation will be expanded to include a number of totally new projects in the machine tool and textile machinery fields.

RYAN INSTALLING $1 MILLION NEW MACHINE TOOLS

SAN DIEGO — Installation of $1 million worth of machine tools in 1954 in tooling up for major new projects is planned by Ryan Aeronautical Co here. Some machines have already been installed, with most to be put into operation this summer and fall.

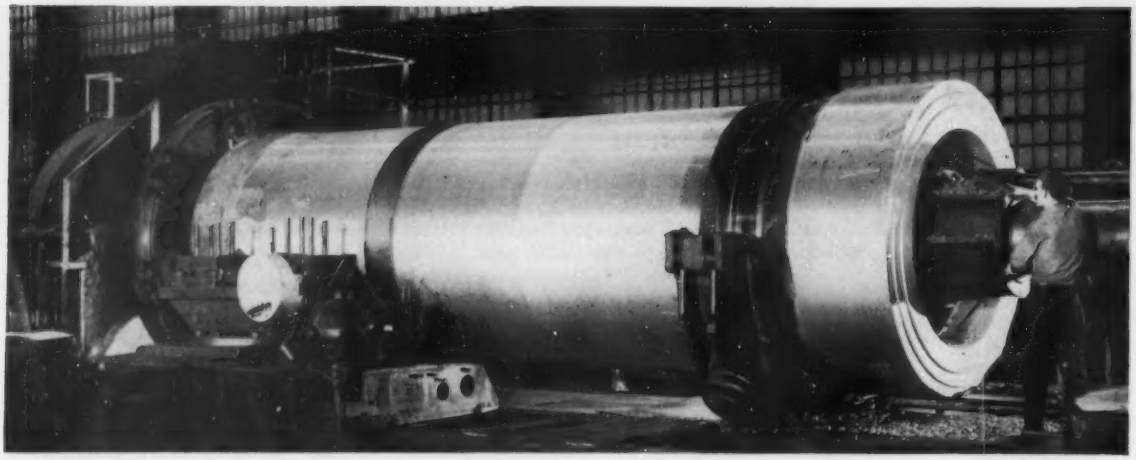
Included in Ryan's machine tool purchases are: a $170,000 hydraulic press for aluminum forming, seven 42-in. bed dia vertical turret lathes, a 42-in. automatic control vertical turret lathe, a 60-spindle and a 42-spindle multiple-spindle drill machine, five universal milling machines, and a radial drill.

MIT TO OFFER TWO-WEEK MACHINE TOOL COURSE

CAMBRIDGE, MASS—A two-week course in Machine Tool Technology will be offered here June 16-25 as part of Massachusetts Institute of Technology's special summer program of education for men in industry. The machine tool course will cover fundamentals of design, usage and evaluation; elements of fine measurement, statistical and quality control, control systems, alignment and vibration.

A special session will be devoted to automatically controlled machine tools and the automatic factory. Lecturers will be members of the Machine Tool Division of MIT's Mechanical Engineering Department, and other specialists.

Details on the course, tuition, housing, etc, are available from the Summer Sessions Office, Room 7-103, Massachusetts Institute of Technology, Cambridge 39, Mass.



FORGED STEEL MAIN CYLINDER FOR 12,000-TON PRESS being machined at Bethlehem Steel Co for shipment to United Engineering & Foundry Co as part of the Air Force Heavy Press Program. After machining, cylinder for the giant extrusion press will be 22 ft long, will have an outside dia of about 7 ft at widest point, will weigh 88 tons

Labor Outlook for '54: Fewer Wage Hikes, Emphasis on Security, Fringe Benefits

WASHINGTON—At wage bargaining tables around the country, one thing is immediately apparent: the once-bulging briefcases carried by union leaders are getting slimmer and slimmer. And in some cases they're just plain empty.

The reason: the business decline and resulting cutbacks in employment have set a new pattern in bargaining, one that figures to last for many months. Here are the factors that set the pattern:

- Wage settlements today are smaller—less than 8¢ an hour on the average. And 10% of today's agreements call for no wage increases at all.
- Instead of the traditional cents-per-hour wage increases, today's contracts are stressing health, welfare and pension plan payments—with the employer paying the added freight.
- There are today a third fewer strikes than last February. And workers are thinking twice before they use walkouts as a bargaining lever.

"Pink Slip" Consciousness

After three years of pat wage hikes, decisive strike action, and snowballing security clauses, today's bargaining table has a new and subdued look. And there's a reason for it. Workers and union representatives are becoming "pink slip" conscious. They are pulling in their horns on wage increases and security clauses. Instead, they're concentrating on keeping what they have.

Wages are still high, despite cutbacks in overtime and premium pay operations, and unemployment is largely confined to just a few industries. There's no panic and bargaining is calm. But less is being passed over the table.

Few or No Hourly Wage Hikes

Recently, unions have been content to settle for small hourly wage increases, or none at all. Here are some examples: railroad brotherhoods 5¢ an hour, CIO chemical workers 6¢ an hour after a 47-day walkout, CIO packing house workers —none, and the same for textile and rubber workers.

Although CIO's auto workers did settle recently on a no-raise basis with Renaud Plastics Corp, Walter Reuther's union as a major pattern-setter will help shore up wages when its million workers come up for a 5¢-an-hour productivity pay raise in May as part of its five-year contract.

This five cents will give other unions ammunition for their wage battles, namely CIO's powerful Steel Workers, whose David McDonald will try to do at least as well as his arch rival, Walter Reuther, in the money department.

And since a 5¢-an-hour boost would be small potatoes for the steel workers compared with their 8½-cents-an-hour hike last year, McDonald will be gunning for such other benefits as increased pension payments, bigger and better hospital and medical benefits, and firmed-up severance and seniority contract clauses.

So instead of a big wage hike, McDonald may shoot for the $137.50-a-month pensions now paid to the auto industry. Reuther won that for his people in another "safe bargaining" year—1949.

This stability will underlie all labor negotiations, at least for the time being, particularly if business slumps further. But the controversial guaranteed annual wage will come up this year—downturn or no—at CIO's steel and electrical union bargaining sessions this summer. It probably won't be a serious battle unless recession gets worse.

1954: "Just usual bargaining"

Labor Secretary James Mitchell sees it this way: 1954 will see "just the usual bargaining" and the guaranteed annual wage will be "organized labor's next big push."

What it all adds up to: for 1954—bargaining for wage and fringe benefits—with emphasis on modified security plans. For 1955—the guaranteed annual wage if business keeps dropping.

Tax Plan on Right Road But It Doesn't Go Far Enough, Congress Told

WASHINGTON — Seven recommendations in President Eisenhower's tax revision program will have a favorable impact on the market for machinery and industrial equipment — but they are only a small part of the changes that should be made. This appraisal was made to members of the Congressional Committee on the Economic Report by George Terborgh, director of research for the Machinery & Allied Products Institute, who appeared on a panel of experts to discuss the outlook for investment this year.

"Reasonably Satisfactory"

Mr Terborgh picked out two of Eisenhower's recommendations for particular emphasis. The administration's plan for quicker writeoff of machinery and equipment was described by Mr Terborgh as "reasonably satisfactory." His chief criticism: the plan is limited to items acquired after January 1 of this year.

Mr Terborgh also listed these tax recommendations on the plus side: extension of loss carry-back to two years; acceptance of research and development costs as income-deductible; liberalization of rules governing accumulation of undistributed profits; a 14% tax advantage granted earnings of subsidiaries and branches operated by US owners abroad; allowing optional tax treatment by corporations and partnerships.

Mr Terborgh admitted that the relief contained in these provisions might be all that should be granted at one time because of the importance of maintaining US revenue. But, he told the committee, the provisions add up to little more than a starter.

Another panel member, CIO Economist Stanley Ruttenberg, argued that the administration's plans to stimulate investment should be scrapped in favor of tax relief for individuals.

The hearings were held under provisions of the Employment Act of 1946, which requires that Congress review the President's Annual Economic Report findings.

Providence (R I) Evening Bulletin

AWARD FOR HIRING DISABLED VETERANS, more than 400 of them, was recently presented to Brown & Sharpe Mfg Co, Providence, R I, by the American Legion. Brown & Sharpe President Henry D Sharpe, Jr, (left) receives the certificate of appreciation on behalf of the company from Legion Department Commander Robert F Bergeon (right) as Legionnaire John F Radikin (center), Department Employee Chairman, looks on. Within the last year, Brown & Sharpe hired over 1000 veterans, 400 of them with some degree of physical handicap

Metalworking Abroad

(McGraw-Hill World News)

AUSTRALIA — British Tube Mills (Australia) Pty Ltd has installed an electric-resistance tube welding mill at its Kilburn, South Australia, plant. Mill converts steel strip to tube in a continuous operation, trebling output. Machine produces 1¼-in., 16-gage tube at 7500 ft per hr.

ENGLAND—Officials of Fridor Fabrieken, Dutch-Swiss makers of Stitchmaster sewing and darning machines, are in this country looking for a possible site for a manufacturing plant.

WEST GERMANY—Output of motorcycles, motor-scooters and bicycles showed varying trends in 1953. Bicycles showed a moderate increase, motorcycles dropped slightly, and motor-scooter production rose 83% over 1952.

FINLAND — This country has ordered 200 direct-injection 5.76-litre-capacity diesel engines from England's Leyland Motors Ltd for installation on commercial vehicles. Leyland will also supply Finland with 125 hp and 90 hp diesels for installation on Finnish-built excavators up to 3 cu-yd capacity.

BRAZIL—Two large Austrian turbine-generator manufacturing firms —"Andritz" and "Elim" have signed a contract with Brazil's Metalurgica Santa Cruz Ltda to produce turbines and generators here at Piracicaba within two years.

SWITZERLAND — Although Swiss machinery exports have been on the increase since last year, orders on hand have declined. Machinery exports reached an all-time high (1,040 million francs) in 1953, contrasted with 1952's 989 million francs, 1938's 205.9 million.

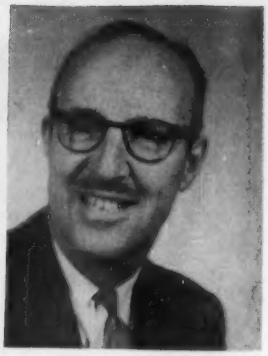
INDONESIA—Imports of machinery, locomotives and tractors will be cut drastically this year because of lack of foreign credits. Thus a one-year moratorium will be declared on imports of all but vitally needed machinery. Emphasis will be on maintenance.

INDIA — Indian government is accepting bids for plant and machinery for its Integral Coach Factory, scheduled to begin production at Madras by mid-1955 of about 350 railway coaches a year. Twenty Indian technicians are leaving for Switzerland shortly to learn railway coach construction.

R C Reinhartsen

Kenneth Slawson

Glen Harmon



Donald L Price

Names in the News

Ray C Reinhartsen, vice president and sales manager of the Onsrud Machine Works, Chicago, has been appointed executive vice president and general manager of the company. Mr Reinhartsen, associated with the firm for the past twenty years in sales and sales management capacities, will now be responsible for plant production and production engineering. Secretary **George M Campbell** has been named vice president and secretary, and Assistant Sales Manager Albert L Breuer is now sales manager.

Kenneth Slawson has been appointed assistant to the president of Ford Instrument Co, Div, Sperry Corp. Mr Slawson joined Ford in 1928; in 1946 he was appointed manager of E G Staude Manufacturing, then a new Sperry division. Following the recent sale of Staude to Bryant Chucking Grinder Corp, Mr Slawson has returned to Ford, where he will deal with general administrative problems.

H G Trotter has been appointed assistant to the executive vice president and general manager of the Morse Twist Drill & Machine Co, New Bedford, Mass. He has been associated with the firm for the past six years in various administrative posts. **William Descault** has been named works manager, in charge of manufacturing operations.

Hershel V Hiatt, formerly assistant chief engineer for the Allison Div, General Motors, has been named director of engineering for the Milwaukee Div, Le Roi Co, a subsidiary of Westinghouse Air Brake Co.

Glen Harmon, assistant chief engineer, Colonial Broach Co, Detroit, has been promoted to new top level engineering duties; he will work directly with the executive vice president and the vice president in charge of engineering on broaching research, policy, sales engineering, and sales consultation. Mr Harmon joined the firm in 1935 and has been assistant chief engineer for the past four years. **Earl Clark,** former University of Detroit athletic director and football coach, has been named a Detroit area sales representative.

Helge G Hoglund has resigned as vice president in charge of sales of the Hendey Machine Co, Inc, Torrington, Conn. He had been associated with the Hendey company for a year and a half. He had previously been general sales manager of the Heald Machine Co, and vice president of the Van Norman Co. **Frank J McCarty** has retired as general sales manager of Hendey after having been connected with the company for 26 years. **Charles A Torson** has been appointed general sales manager in charge of all of Hendey's sales activities. He has been with the company many years, having come up through the shop to service man, salesman, and, more recently, assistant sales manager.

Louis K Biskach has been appointed general superintendent of production at the Chevrolet assembly plant in Oakland, Calif. He succeeds **John K Smyth,** named to a similar position at the company's plant in Kansas City, Mo. Prior to the appointment, Mr Biskach was division superintendent for Chevrolet at Baltimore.

Donald L Price has been named sales manager of Norton Co's Abrasive Div. Mr Price, who has been sales manager of the eastern region since 1952, joined the company in 1920. In 1926 he was sent to Detroit as an abrasive engineer, and later served as district manager until 1949 when he was recalled to Worcester.

Howard M Palmer has been appointed vice president, sales, of Lewis-Shepard Products, Inc, Watertown, Mass, manufacturers of materials handling equipment. Mr Palmer moves up from his three-year post as general sales manager. He joined the company in 1945 as head of power division sales.

H E Elliott has been appointed sales manager of The Watson-Stillman Co, Div, H K Porter Co, Roselle, NJ. Mr Elliott has been associated with the firm for the past 25 years, and has been instrumental in developing many lines of the company's hydraulic presses and equipment. **R W Schreck** has been named assistant sales manager, specializing in plastics machinery.

Daniel J Cockrell has been appointed sales manager for Magnetic Engineering & Mfg Co, Clifton, NJ. He joined MEMCO as assistant sales manager in 1951 and was appointed export manager in 1952, a position he still holds.

Robert R Teller has been appointed manager of the Detroit office of Davis & Thompson Co, Milwaukee. Mr Teller has been associated with the Ford Motor Co's production engineering department, where he was responsible for acquisition of production equipment.

Edwin C Evans

Alan A Hutchings

R G Ellis

Adam B Cribbs

Edwin C Evans, director of manufacturing of Behr-Manning Corp, a Norton subsidiary, has been elected a vice president. A member of the firm since 1934, Mr Evans has served as assistant to the vice president in charge of engineering and manufacturing, assistant general manager of the Abrasive Div, and was made director of manufacturing in 1952. **Leon H Hoogstoel,** the firm's technical director since 1945, and associated with the organization since 1930, has also been elected a vice president.

William R Plummer has been appointed general sales manager of Garland Mfg Co, Detroit firm engaged in the tooling, stamping, and special equipment fields. Prior to his appointment, Mr Plummer was sales manager of Progressive Welder Sales Co, and has been associated with the metalworking industry for the past 20 years.

Clyde M Adams, secretary of Bohn Aluminum & Brass Corp, has been appointed deputy director of the Aluminum and Magnesium Div, Business and Defense Services Administration of the Commerce Dept. Mr Adams, on loan to the government under a rotation system, succeeds **Everett G Fahlman,** president of the Permold Co, Medina, Ohio, who is returning to his company.

Carl E Overton has been elected vice president, sales, for Brad Foote Gear Works, Cicero, Ill. Prior to joining the firm in 1948, Mr Overton formed the Austin Tool Works where he invented and patented an expanding mandrel which is used widely in gear manufacturing. In 1949 he was made Brad Foote works manager, and the following year, sales manager.

Alan A Hutchings has been appointed to the newly-created position of vice president, sales, F J Stokes Machine Co, Philadelphia. A member of the firm since 1940, Mr Hutchings was named general sales manager in 1950.

R G Ellis of the engineering department of Micromatic Hone Corp, Detroit, has been promoted to assistant chief engineer. Mr Ellis, who has been designing machine tools for 27 years, has been with Micromatic since 1939.

Thomas H Brumagin has been appointed chief engineer of the Ajax Flexible Coupling Co, Westfield, NY. A member of the organization for the past seven years, Mr Brumagin will direct engineering of company's rubber-bronze bushed and dihedral couplings, vibrating screens, and shakers.

G S Massa has been appointed vice president of Com-Air Products, West Coast manufacturers of hydraulic and pneumatic assemblies. Mr Massa was vice president in charge of manufacturing at Hydro-Aire, Inc, until his recent resignation, and prior to that was associated with Consolidated Vultee for eleven years.

William Adam, Jr, has been elected president of Ajax Electric Co, Philadephia, following the retirement of **Dr G H Clamer. John E Haig** and **Leon B Rosseau** have been named vice presidents. Dr Clamer will continue to head Ajax Electro Metallurgical, Ajax Electrothermis, and Ajax Engineering Corps.

C P Mayer has been appointed manager of roll sales of the Mesta Machine Co, Pittsburgh; he has been a member of the firm for the past eleven years.

Adam B Cribbs has been named manager for tool engineering at Goodyear Aircraft Corp, Akron, Ohio. Prior to joining the organization Jan 1, Mr Cribbs was associated with the LaPorte, Ind, Aircraft Div, Whirlpool Corp, and with the Glenn L Martin Co. **James S Nielsen** has been appointed manager for tool manufacture, and **M Martin Pflug,** manager of tool planning and processing. **Robert J French** has been assigned duties as manager of tool design.

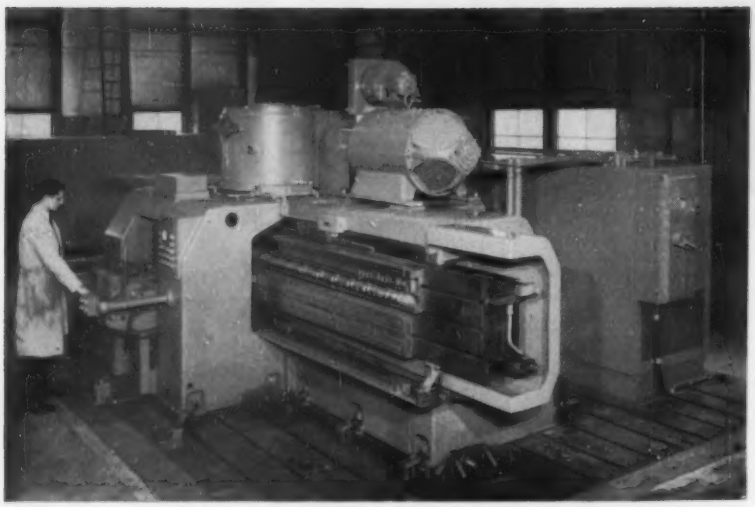
William W Fisher has been appointed vice president in charge of operations for American Type Founders, Elizabeth, NJ, and **Robert A Tobias,** vice president, sales. Mr Fisher, formerly vice president and general manager of the Elizabeth plant, will head engineering and manufacturing activities there and at the new works in Mount Vernon, NY. Mr Tobias has been serving as director of marketing for the company.

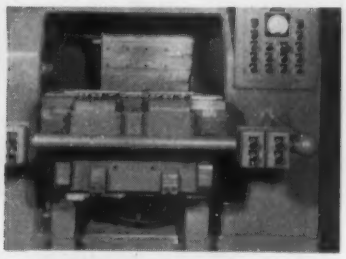
Lewis S Plett, general service manager of Minneapolis-Moline Co, has retired after 42 years' service with the firm. **David J Wisehart,** formerly assistant, has been named to succeed Mr Plett. **Harold W Lage,** export service manager, takes over Mr Wisehart's post.

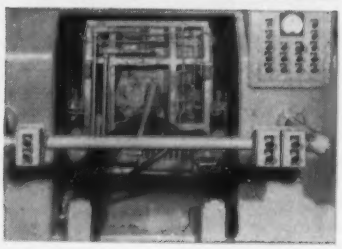
Lester J Henderson has been appointed sales manager of the Weatherhead Co's (Cleveland) newly-created industrial division. Mr Henderson joined the company, manufacturers of hose and couplings, in 1935; in 1945 he was made production manager for all plants, and five years later named sales manager of the aviation division, a post he retains in addition to his new responsibilities.

(Continued on page 188)

New Shop Equipment







Double-Acting Colonial Broaching Machine

Colonial Broach has announced a standard high-speed broaching machine electrically controlled with double-acting mechanical drive and hydraulically actuated fixture. The 25-ton machine, Model HM-25-130, has a maximum stroke of 130 in. Ram speed of the standard machine is infinitely variable from 30 to 150 sfm in both directions. Both ram speed and length of stroke can be increased for specific broaching operations. Design of the machine makes it suitable for various types of worktable construction. A job control panel is provided for use in setup and tryout.

The width of the ram is 24 in. All electrical and hydraulic equipment is installed in accordance with JIC standards. Automatic pressure lubrication is used throughout. Ways are hardened and ground to provide highest standard of cutting accuracy.

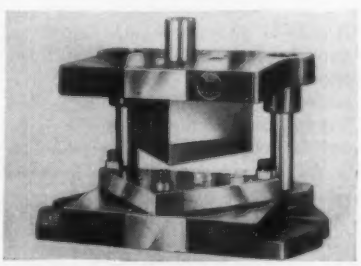
Floor space requirements are 194 by 290 in., including cabinets and motor-generator set. Over-all height is 96 in.; gross weight 80,000 lb. Ram drive is supplied by dc motor rated at 150 hp, 75 rpm. Motor is coupled to an 18-in. center distance, 20:1 ration, cone-drive double-enveloping worm gear set driving a precision-ground, helical pinion which in turn drives rack to provide high capacity for the ram. The machine is capable of developing a peak of 300 hp.

The first unit of this new standard line, illustrated above, was assigned to a V-8 engine program of a leading auto manufacturer. It is broaching close-grained cast iron bearing cap clusters at a speed of 142 sfm. Carbide insert broaches cutting on both the initial and return stroke remove stock from two bearing cap clusters. Metal is removed at a rate of 3¼ lb per cycle with depth of cut varying from 5/32 to 3/16 in. Cycle time is 21 seconds, permitting normal production of 210 clusters per hour.

To start the operating cycle, two bearing clusters are placed in position on the worktable and locked in place by pushbutton clamping. Cycle is started by depressing two start buttons at spread center distance for safety. Automatic cycle is electrically interlocked and hydraulically actuated.

The worktable swings up into vertical position for the first broach pass and is held securely in place by two hydraulically actuated lock pins. The ram moves from right to left for the first broaching pass to broach a half round and a qualifying side used as a reference point for subsequent machining operations. Fixture then shuttles down 10 in. to the return cutting position. The second broaching operation is performed with ram moving from left to right. At completion of second cutting stroke, two locking pins withdraw and the worktable trunnions outward with part-holding fixture returning to starting position simultaneously. Operator depresses unclamping button to release parts.

Colonial Broach Co, Box 37, Harper Station, Detroit 13, Mich

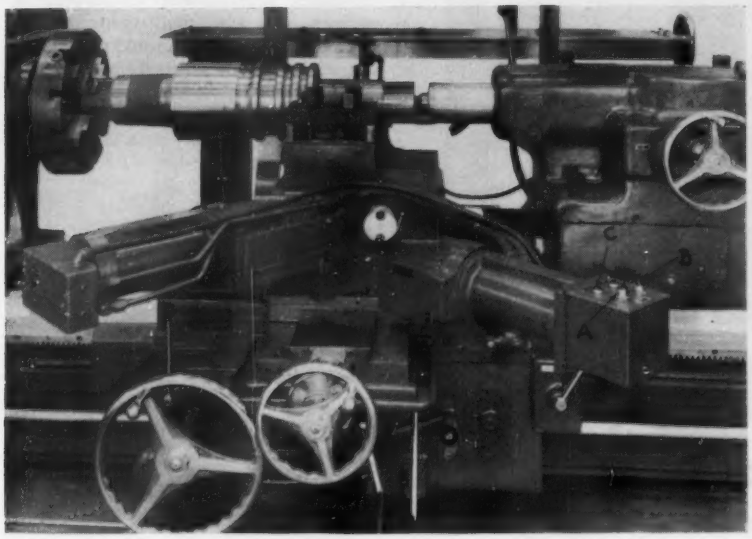


Arc-Fit Tool V-Notches Angle Iron to 90° Bend

Precision tool V-notches angle iron to give full 90° bend. Tool, consisting of punch, die, and die set, will notch angles up to and including 3x3x⅜ in. and flat stock of ⅜ in. thickness. Notching action is said to give sharp, smooth cuts with absolutely no deformation of stock.

Vogel Tool & Die Corp, 1807 N 32nd Ave, Melrose Park, Ill

Materials and Parts



Automatic Cylinder Selection for Hydraulic Roll Duplicating Lathe

Automatic feature added to the American hydraulic roll duplicating lathe is an electrical device working off the templet which automatically selects the correct operating cylinder and makes the change from one cylinder to the other at the proper time, relieving operator of this manual operation.

Contacting buttons are located at predetermined points on templet; when contactor touches one of these buttons, automatic selector mechanism is energized and changed from one cylinder to the other.

Automatic feature is in addition to manual control. A selector switch located on the control box attached to right-hand cylinder provides selective means for either manual or automatic cylinder control at operator's discretion. (Arrow A) When manual control is engaged, pushbutton (Arrow B) controls cylinder selection. Whether manual or automatic selection is used, indicating lights (Arrow C) show which cylinder is in use. Lights change automatically when actuation of cylinder is changed from one to the other.

The American Tool Works Co, Pearl St at Eggleston Ave, Cincinnati 2, Ohio

Black Granite Straightedges With Commercial Accuracy

A line of commercially accurate black granite straightedges in lengths up to 72 in. has been developed to supplement the precision straightedges made by Collins Microflat. Surfaces are finished to an accuracy of 0.0002 in. per fit, whereas surfaces of Microflat super precision straightedges are finished down to 50 millionths over-all. Collins states that the majority of commercial applications do not require such extreme accuracy and finds that 0.0002 in. per ft is adequate. Reduction in work involved in producing and finishing to this accuracy results in a more economical straightedge. They have the same advantages as the regular line of precision straightedges and are said to be non-warping, non-deflecting, easily washable, smooth, temperature inert, rigid over-all, and moisture repellent. Ends are tapered and fitted with leather grips for easy, secure handling.

Collins Microflat Co, 2326 E 8th St, Los Angeles, Calif

... INCLUDING

Computer component, size of cigarette package, performs vector operations using heat transfer principle ..... page 148

Gear shaver handles internal spur and helical gears from 3 to 12-in. pitch dia ..... page 148

Tap produces self-locking internal thread ..... page 149

Instrument doubles as optical form grinder projector and standard optical comparator.. page 149

Die-casting machine, cold- chamber type, obtains 300 complete casting cycles per hr.... page 152

Non-destructive testing of non-metallic solids uses automatic scanning and ultra-sonic absorption techniques..... page 154

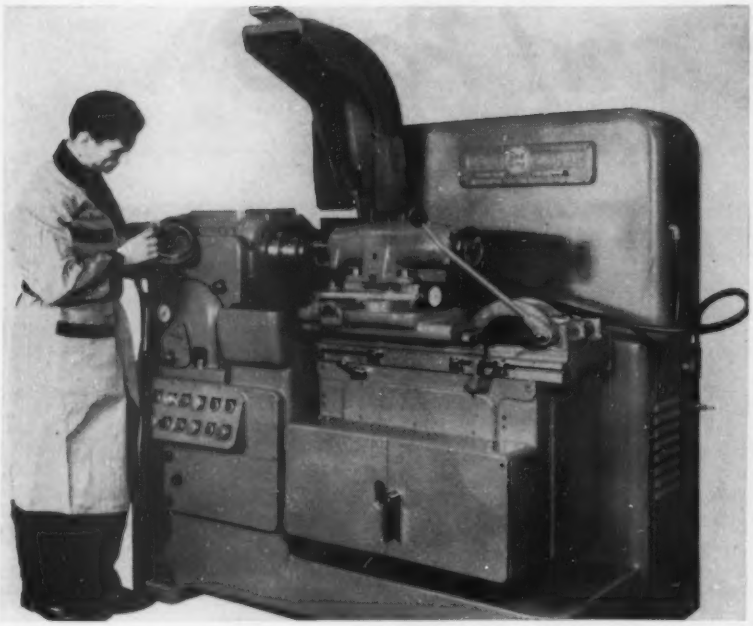
Torque-limiting safety clutch features trigger action and adapts to speeds as low as 1 rpm.. page 156

Geared head drillpress incorporates magnetic starting, infinitely variable spindle speed in two ranges, and optional automatic tapping ..... page 160

... and in Mar 15

Horizontal platen grinder incorporates both platen and contact roll and uses serrated rubber contact belt.

High-speed plate saw handles aluminum plates to 4 in. x 12 ft, raises stock hydraulically.



Internal Spur, Helical Gears Shaved on Red Ring Machine

Red Ring gear-shaving machine for precision shaving operations on internal spur and helical gears from 3 to 12-in. pitch diameter is announced by National Broach. Designated Model GCR, this machine tool is designed specifically to finish only internal gears. Gears having up to 4 diametral pitch teeth and face widths up to 2½ in. can be shaved. Shaving action is accomplished by crossed axes principle. Work is mounted on driving head with axis in horizontal plane; gear shaving cutter engages work gear with cutter spindle centerline set at crossed axis angle with work. Either conventional or plunge-cut shaving methods can be performed. With conventional method, work drives the cutter and cutter is reciprocated across work face. Cutter is automatically fed vertically at end of each stroke and allowed to dwell at finished depth before being retracted. With the plunge-cut method, cutter is fed to depth without reciprocation.

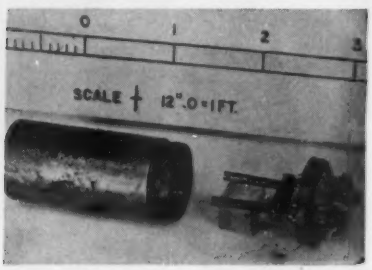
Machine has a heavily ribbed cast iron base containing the coolant pump, and cutter reciprocation motion motors. Work drive motor is directly coupled and mounted on base behind workhead. Workhead is designed to permit installation of pot-type or diaphragm work-holding chucks. It can be locked in positions up to 1½° each side of a vertical centerline to permit taper shaving operations. Optional pivoted workhead mounting permits head to pivot upward at a 30° angle to cutter centerline, thus permitting long stemmed gears to be easily loaded and unloaded. A single air cylinder controls head pivoting and locking action.

Vertical V-ways guide a knee which is supported vertically by a leadscrew and nut assembly. Cutter spindle is mounted on the knee by a double slide arrangement. Entire spindle and upper slide assembly are reciprocated back and forth during shaving operation by the leadscrew and nut arrangement. Differential upfeed mechanism is housed in the knee. This mechanism is essentially an air-operated stepped gaging device which provides automatic precision upfeed in selected increments throughout shaving cycle and automatic return to correct backlash position for loading and unloading. Cam is designed to suit individual operation requirements. Seven increments of feed and four increments of dwell, or any portion of these, are provided in the cam.

Additional features include a machine design that avoids suspension mounting of principal machine elements to reduce deflections and provide maximum rigidity and precision, and centralized pushbutton controls for setup and operation.

Over-all dimensions of the machine are 62½ x 39¾ x 64 in. A 3-hp motor powers the work spindle, and cutter reciprocating mechanism is driven by ½-hp motor. Coolant supply is provided by gear-type coolant pump driven by ¼-hp motor. Change gears are provided for work spindle rotation and cutter reciprocation drives. All electrical controls are JIC standard and mounted in control panel at rear of machine; pneumatic controls are in separate space.

National Broach & Machine Co, 5600 St Jean Ave, Detroit 13, Mich



Heat Transfer Is Basis for Tiny Analog Computer Component

Arma Corp, as part of its development program for the military, has introduced into some of its advanced systems a computer component for analog calculations which is no larger than a cigarette package. The device is capable of performing addition, subtraction, multiplication, division, integration, and basic operations of vector calculus.

Simply stated, the component operates on the basis of heat transfer. An incoming electrical signal is dissipated into heat by a transducer. The resulting temperature differential is applied, together with a reference signal, to a Wheatstone bridge. The output of the transducer is directly proportional to the unbalance of the bridge.

The unit has no moving parts and should be easily mass-produced. Applications include: navigation at supersonic speed, automatic gun-laying, guiding missiles, and automating machines and processes.

Arma states that there should be no limit to possible applications in the future when the sub-miniature size and weight, the accuracy, the plug-in replaceability, the speed of reaction, and the reliability of the component are considered. Reaction time is reportedly one-fifth that obtained heretofore; volume and weight of instrumentation replaced for the multiplication operation would be five times as great.

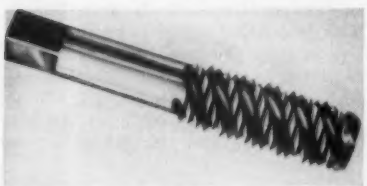
Arma Corporation, Garden City, NY

Two Models of Wilson Repeat Cycle Electronic Timers

Two fully enclosed repeat cycle electronic timers provide on-cycles ranging from 0.01 to 150 seconds and off-cycles ranging from 0.01 to 900 seconds. The timers are suitable for a wide range of industrial and laboratory controls where the timing device must be stable and accurate in nominal changes of line voltage and temperature.

The timers, designated Models 2 and 3, are housed in steel cabinets 9 x 10 x 5 in. with external settings for the range of the instrument. They utilize one radio-type tube and a voltage regulator to charge the two resistance-capacitance networks. During operation one cycle automatically initiates the next without moving parts or external operation.

G C Wilson & Co, 1950 Eighth Ave, Huntington, W Va



Shearcut Tap Produces Self-Locking Internal Thread

Shearcut Tool Co has announced the Shearcutter Ever-Lock tap which produces a self-locking internal thread. Shearcut states that through the use of this tool manufacturers will secure tremendous saving in the production costs of the article they manufacture, for through its use locknuts, lockwashers, castleated nuts, cotter pins and other screw-locking devices may often be eliminated. The taps were originally conceived for high-temperature applications in turbo-jet engines and are produced in Class PG-II only, but are made to produce three classes of fits: snug, tight, and extra-tight.

Tests were made with Phillips Allen head socket screws. One test of 5/16-18 pitch Ever-Lock tight-fit tap in CR ½ in. thick, "F" drill used for hole, tapped in Fearless high-speed tapper at 600 rpm, tests made dry, indicated a 28-in.-lb torque after five turns, 120-in.-lb torque after nine turns. The decrease in locking torque at the 20th insertion was 33½%. All measurements were taken at prevailing torque with part moving in hole.

Shearcut Tool Co, Ever-Lock Tap Div, 7045 Darby Ave, Reseda, Calif

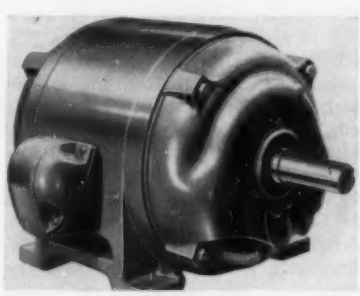
Optical Instrument Doubles As Form Grinder Projector-Comparator

Model OFG-200 optical form grinder projector-comparator has been announced. Instrument may be used on standard precision surface grinders of 6x18 or 8x24-in. size. Operation is said to be simple, as the conventional grinder controls are used to develop most shapes and forms by following the enlarged drawing on the projection screen. When not needed for use as an optical form grinder, equipment is readily removed and may be placed on a bench and used as standard type optical comparator.

The instrument features the long focal length Portman multi-phase optical system; lenses to provide magnification from 10 to 100X are obtainable as standard equipment. The light source has a variable volume control, is blower cooled, and provides uniform illumination over the 16-in.-dia screen.

Accessories available include a completely universal work stage with precision vertical and traverse measuring means, graduated rotary screen with vernier scale, cabinet-type base with rollers, drawers and partitions for charts and screens, and a separate motor-driven circular grinding attachment.

The Portman Instrument Co, Inc, Town Dock Road, New Rochelle, NY

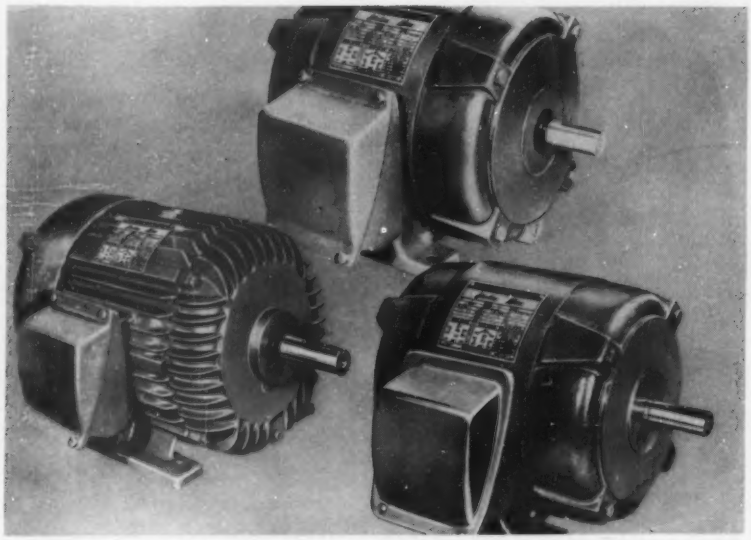


More hp, Less Space For US Electrical Motor

US Electrical Motors has introduced its new motor to conform to NEMA specifications. Designated Uniclosed, Type H, it is more compact and offers complete drip-proof design, and splash-proof protection. The frame is solid cast iron and the stator is prewound. Baffles of new design within air vestibules of end brackets prevent splashing from entering and coming in contact with windings.

The motor meets the same standards as its former type in temperature rise and torque. Slot design of laminations has been improved, and asbestos-protected windings have been reinforced and strengthened by the addition of Mylar laminations. Another feature is the split dome, cast-iron terminal box which makes leads more accessible. Air-impeller blades on the rotor ends have been redesigned with curved edges for quieter operation. All castings are normalized. Lubriflush lubrication of the bearings provides means of replacing old grease with new without necessity of disassembling motor or disturbing bearings. Air intake is designed to avoid pickup of dust.

US Electrical Motors, Inc, Box 2058, Los Angeles 54, Calif



Life Line-A Motors Meet New NEMA Standards

The results of a long-range research program at Westinghouse have provided a line of motors to meet the new suggested NEMA standards which call for smaller motors per horsepower. In addition, Westinghouse states that there are improvements in insulation, a more efficient and better protected bearing, an improved ventilating system, and quieter operation.

The insulation used for stator and rotor windings is Bondar wire, a synthetic resin insulation especially developed to have good thermal endurance, high dielectric strength, and good physical and chemical properties to meet the requirements imposed by vibration, impact, corrosion, and other physical and chemical abuse. Slot insulation is a combination of Mylar polyester film and rag paper to meet the requirements of high dielectric strength and provide physical properties to withstand the shocks, vibrations, and mechanical stresses imposed by the coils in the slots. The Bondite dip insulation is a clear phenolic-alkyd thermosetting-type varnish developed for extremely high dielectric strength and to be physically rugged enough to combat the effects of oil, solvents, moisture, and other contaminants. This dip insulation is fortified with water-repelling silicone and is said to have, at elevated temperature, a life of 170% of the previously used varnish. The motor leads, smaller in diameter and more flexible than previously, have an insulation with a life reported to be twice that of previously used cable or lead insulation at normal operating temperatures, rated at 75° C compared to 60° C for previous cable insulation. Lacquered glass-braid covering on the cable not only provides greater heat resistance, but also higher strength.

To increase the drip-proof quality for all mounting positions, the ventilation openings on the motor are comparatively small, and are located normal to the shaft axis in one quadrant to the periphery of the end-brackets. To make the motor completely drip-proof, the end brackets can be rotated to a position.

Although the Life Line-A motors are smaller, there has been no sacrifice in electrical characteristics. The effective volume of electrical sheet steel is about 15% less, the weight of copper the same. Steel reduction has been made through selection of high-grade silicon steel, reducing losses for a given flux density by 20%. There has been no reduction in permeability in making this decrease. The line uses circular punchings with a smaller frame to make maximum use of available space. Stray load losses have been kept at a minimum by design, processing, and treatment of rotor surfaces.

The bearings have a four-way seal —two on each side of the motor bearing. The grease used in the bearings has been thoroughly tested in laboratories and field installations, and is reported to give assurance of being a long-lived, versatile, and reliable lubricant. To prevent the motor breathing through the bearing, a combination bearing by-pass and neoprene external flinger is incorporated.

The blower on the fan-cooled motor is a molded glass plastic with high corrosion resistance. The motor frame has fins to provide maximum area for heat dissipation. All exposed products of both totally enclosed non-ventilated and totally enclosed fan-cooled motors are corrosion resistant.

Motor frames are made of cast iron. Drip-proof enclosure is said to be virtually splash-proof and the splash-proof enclosure has consequently been eliminated. Another feature reported by Westinghouse is that the stator coils are so positioned that the required electrical characteristics are produced with minimum of accompanying harmonics that produce noise. Manufacturing procedures assuring more uniform air gaps have been adopted.

Illustrated above are the three motors in the Life Line-A Series. The drip-proof motor is on the right, the totally enclosed fan-cooled on the left, and the totally enclosed non-ventilated in the middle.

Westinghouse Electric Corp, 401 Liberty Ave, Box 2278, Pittsburgh 30, Pa

Electronic Gage Measures ID

Federal air-electronic gage measures the ID and stamps the size of refrigerator cylinder block bores. Cylinder blocks are stamped into 16 categories, each equal to 0.0001 in., plus oversize and undersize. The speed depends upon operator who manually selects workpieces according to classifier lights or stamped markings.

Operator places each piece on Dimensionair plug and rotates it to find smallest ID. Size signal obtained is amplified and sent to a 17-stage classifier. When piece is removed from air plug, signal stops "memory" marking wheel with correct number in position. Operator then slides piece into stamping unit and air-operated hammer swings down to mark it. Timer automatically prepares gage for new measurement signal.

Instrument is said to combine the accuracy and stability of the Federal Dimensionair for internal measurements with the sensitivity and versatility of the Model 130 electronic gaging unit. It can be adapted for measuring and marking ID's of castings, housings, plates, and motor blocks. Any number of air plugs can be used for gaging various ID's.

Federal Products Corp, 1144 Eddy St, Providence 1, RI

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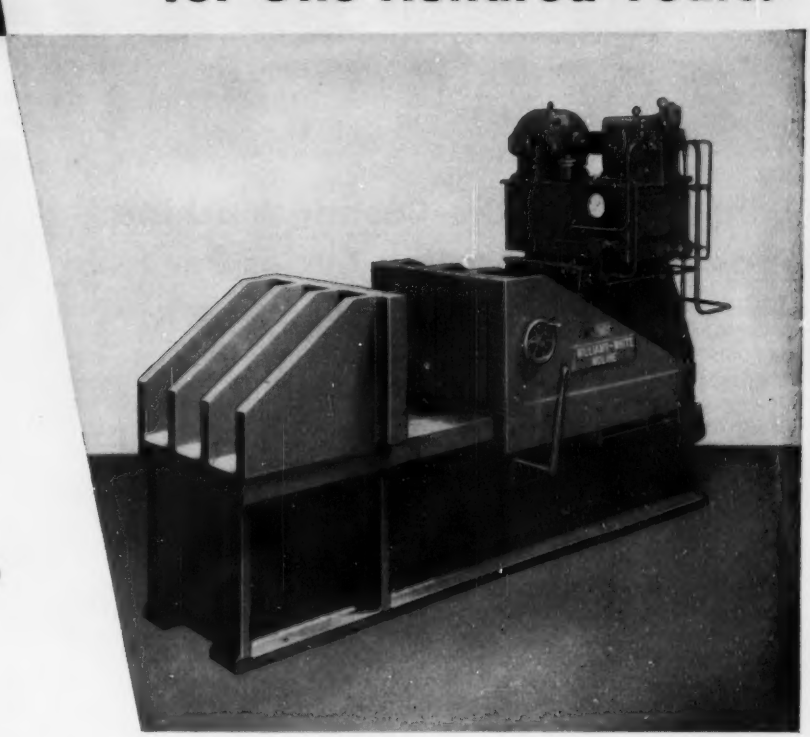
Builders of Quality Machinery for One Hundred Years!

200-TON HYDRAULIC BENDER and STRAIGHTENER

- Stroke, 24 in.
- Daylight, 30 in.
- End Lug and Cross-head, 30 in. by 48 in.
- Sensitive lever control
- Welded steel construction with fixed lug



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Los Angeles, Calif.

See our exhibit at the A.S.T.E. Exhibition in Philadelphia, April 26 through 30.

Control to the fraction of an inch is the feature of this Hydraulic Bulldozer built by WILLIAMS-WHITE & CO. The hand lever controls direction and speed of crosshead, the speed being proportionate to the distance the hand lever is moved.

An adjustable stop provides means of stopping crosshead at any point in the forward stroke. The hand wheel, one on each side of the machine, controls the position of this adjustable stop, assuring sensitive, positive control.

In the event the crosshead does not accomplish the desired bending or straightening operation, turning the hand wheel adjusts this stop permitting the crosshead to continue forward a distance proportionate to the amount of adjustment.

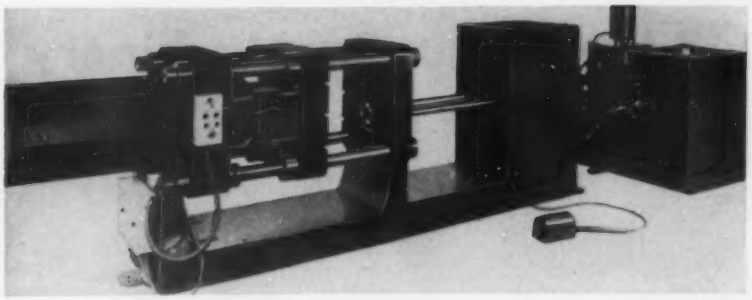
This stop may be rendered inoperative when the machine is used for conventional Bulldozer operations.

A CENTURY IN MOLINE

WILLIAMS - WHITE
MOLINE

WILLIAMS - WHITE & CO.

MOLINE, ILLINOIS



Cold Chamber Die-Casting Machine Provides 300 Casting Cycles Per Hour

Harvill has introduced a heavy-duty cold-chamber type die-casting machine designated Model HD-303, particularly adapted to casting aluminum alloys at high speed from either single or multiple-cavity die. Magnesium and brass are also readily cast with the cold chamber machine; zinc, lead, and tin may be cast after conversion to hot chamber operation. Up to 300 complete casting cycles per hour may be obtained.

High pressure oil hydraulic system supplies operating and injection power for the unit with pressures to 11,800 psi on the molten metal. The injection assembly and all controls are positioned to afford easy and high-speed operation.

Harvill reports that the most important of its features is the design which permits fast and easy die changes. The tiebar is pulled back out of the way and platens are opened on all sides to allow full access. T-slots in the platen faces eliminate the necessity of drilling through to attach irregular-shaped dies. In addition, the machine prevents molten metal from being injected unless the dies are fully closed and locked under 300 tons of pressure.

Machine permits pulling cores in all directions. Cores may be operated manually, hydraulically, or mechanically. Dies are closed and held by knuckle-joint design. The compound toggle has maximum of compression-bearing area and tiebars are prestressed when dies are closed to withstand metal injection pressure of 10,000 psi over a die-projected area of 75 sq in.

Piping and fittings on the hydraulic system are high-pressure steel welded at the joints with flange connections to valve and pump. The motor is 15-hp, 220-v, 3-phase with pushbutton control.

The self-contained power unit with motor, pumps, accumulator, reservoir and pressure controls is a separate piece, and may be placed in any position with relation to die-clamping part of machine. The power unit pump is completely unloaded when the pressure setting is reached; it does not pump against pressure head or relief valve.

H L Harvill Mfg Co, Corona, Calif

DPS BOWL FEEDER, based on the vibrating principle, has been designed to provide fully automatic, oriented, single-line feeding to grinding, packaging, inspecting, and other automatic machines and operations. Device handles parts that normally could not withstand tumbling —*Detroit Power Screwdriver Co, 2801 West Fort St, Detroit 16, Mich*

Automatic Coupler

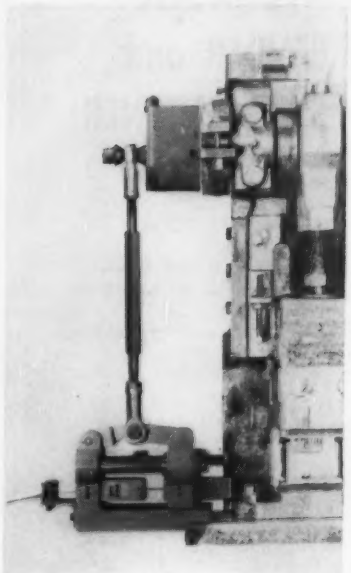
Quick-detachable coupler, called Foster-matic, is available for air reciprocating tools. Lightweight, automatic unit holds tightly yet swivels freely. Half-moon dogs, offering long bands of gripping contact, lock at 45° and are positioned by a floating steel carrier. Can be attached directly to tool without use of lead hoses.

Foster Mfg Co, 2830 Gravois, St Louis 18, Mo

Cup Wheel Guards

Line of wheel guards for flaring cup and straight cup wheels has been developed jointly by the Safety Committee of the Grinding Wheel Institute and Morrison Products. Guards, which revolve with the wheels, provide maximum protection without interference with work by cutting down visibility. Available in four flaring sizes and three straight.

Morrison Products, 16816 Waterloo Rd, Cleveland, Ohio



Power-Press Feed Operates On New Locking Principle

Micro-Slide Feed has been developed for feeding sheet stock for stamping within tenths of a thousandth under rugged conditions. According to the manufacturers, a new principle locks material from both top and bottom simultaneously on forward stroke, and releases simultaneously on back stroke. Resilient floating rollers permit stock to move forward only; grippers automatically adjust for different thicknesses of material and burrs; micrometer limit nuts are said to give fine, positive adjustment.

Errors caused by unequal action in locking material are said to be eliminated; the more resistance encountered, the tighter stock is held, without nicking or marking.

In a test run of 0.007 brass being fed 0.750 at 200 spm, without pilots, and pulling a non-automatic reel with a 50-lb coil, unit was set 20° out of line with the die to aggravate conditions. Results showed variations not in excess of 0.0004.

Nadel Mfg Co, 20 Warren St, New York 7, NY

All work and some play makes this a smart buy

6,000-r.p.m. wheel speed is "stopped" by 1/10,000 sec. stroboscopic exposure. (Wheel guard removed to show detail.)

Watch rough grinding problems melt away fast, *safely*...when a CARBOFLEX Depressed Center Wheel goes to work. Undercut and reduce heavy welds, rough off fins and sharp edges, notch and cut off gates and risers, remove surface defects. Breeze through *any* general purpose roughing, slotting or cut-off operation in record time...with maximum safety. CARBOFLEX Wheels by CARBORUNDUM combine extreme high strength and resistance to cracking with maximum cutting ability...give you more production at less abrasive cost. Both sides of these strong, fabric-reinforced wheels are knurled. Cut with either side plus the edge. Call your CARBORUNDUM Distributor or Salesman today for a demonstration of this new cost-cutter.

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We put our knows to your grindstone

Three to five years of research, engineering and testing go into the development of a new grinding wheel by CARBORUNDUM . . . as much as you'll find behind any other precision machine tool in your shop. New resinoid bonds present tricky engineering problems. The bond is the "tool holder" of the grinding wheel . . . differs only in that it must automatically release dull or broken grains so that new ones can take over the cutting. New resins are under constant test in CARBORUNDUM's laboratories. Some will become bonds in wheels designed for tomorrow's grinding machines. Meanwhile, your CARBORUNDUM Distributor or Salesman offers a complete line of fast, cool-cutting wheels for today's precision needs. Call him—right now!

Through product quality and application "know-how"

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MACHINES AND ATTACHMENTS

1 CYLINDRICAL GRINDERS—*Landis Tool Co, Waynesboro, Pa.* 20-page booklet illustrating job-engineered units, covers plain grinders, multiple wheel setups, special tooling and special single purpose cylindrical grinders.

2 PRESSROOM EQUIPMENT—*Durant Tool Supply Co, Providence, RI.* 15-page catalog illustrates complete line, including new series of safety guards.

3 FLEXIBLE-POWER PRESSES — *General Mfg Co, Detroit 11, Mich.* 4-page bulletin 401 provides illustrated information on units, accessories, and straightening attachments; includes applications.

4 MILLER — *Nichols-Morris Corp, White Plains, NY.* 6-page folder "The Miller that Uses its Head" gives details and specifications, pictures, and data on versatile units, features and applications provided.

5 AUTOMATIC SCREW MACHINES —*Guthery Machine Tool Corp, New York.* 32-page catalog contains illustrated data on Traub machine tools, attachments, and accessories.

6 PROFILOMETER — *Micrometrical Mfg Co, Ann Arbor, Mich.* 8-page bulletin LT89 describes and illustrates unit's operating features for measuring surface roughness. Applications and versatility included.

7 CYLINDRICAL GRINDING—*Landis Tool Co, Waynesboro, Pa.* 35-page "How to Do It" manual contains 17 illustrated chapters, tables, charts; section on troubles and corrections, operating and maintenance suggestions, cost-improvement, and operator training.

8 MACHINE TOOL AUTOMATION—*Turchan Follower Machine Co, Detroit, Mich.* 24-page catalog covers hydraulic duplicating attachments for standard machine tools; designing and building complete control systems; new tracer-controlled units.

9 METAL SAWING MACHINE—*Peerless Machine Co, Racine, Wis.* 16-page brochure illustrates revised Mechani-Cut hack sawing unit. Contains data on automatic, semi-automatic, and manual conveyors used in conjunction with these saws. Charts included.

10 SPIRAMATIC JIGMIL — *DeVlieg Machine Co, Ferndale, Detroit 20, Mich.* 23-page catalog illustrates range of basic machines for precision boring and milling. Features for variety of applications, attachments and accessories included.

TOOLS AND ACCESSORIES

11 DRILLING & TAPPING UNITS—*Rockwell Mfg Co, Delta Power Tool Div, Pittsburgh 8, Pa.* 20-page catalog describes line of self-contained, automatic, quill-type power units. Specifications, applications illustrated.

12 LAYOUT & INSPECTION EQUIPMENT—*Challenge Machinery Co, Grand Haven, Mich.* 20-page catalog No 838 illustrates and describes surface plates, floor plates, surface plate equipment, workbenches, etc, for assembly and general production.

13 AMPLIFYING GAGES & COMPARATORS — *George Scherr Co, New York 12, NY.* Circular on Millimess indicators, available in two models. Can be furnished with a stand for use as a comparator, called Compar-It.

14 CARBIDE TOOLS — *Kennametal, Inc, Latrobe, Pa.* 72-page illustrated catalog 54 contains complete specifications, prices, grades, special tool features, technical data, and applications.

15 MICROBORE — *DeVlieg Microbore Co, Ferndale, Mich.* 45-page catalog 54 provides illustrated data on basic tool for boring, turning, and facing. Presents applications and engineering data, and examples of special equipment for production operations.

16 WAVOMETER—*Micrometrical Mfg Co, Ann Arbor, Mich.* 8-page bulletin illustrates instrument for measuring average mu-in. height of waviness irregularities around symmetrical surfaces of rotation such as bearing races.

17 DECIMAL EQUIVALENT CHART —*Reiff & Nestor Co, Lykens, Pa.* Tap drill and screw thread chart, pocket-size, vinylite, lists fractions and decimal equivalents from 1/64 to 1 in. by 64ths. Opposite side gives NC and NF threads.

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pipe, and ASME standard and special threads with equivalent tap and body drill sizes for wide range of sizes.

18 PRECISION INSTRUMENTS — *Geneva Dial Indicator Co, Chicago.* 16-page catalog 106 provides illustrated information on complete line, including dial indicators, indicator test sets, bench set, bench, dial snap, and depth gages.

HEAT TREATING AND WELDING

19 ELECTRIC HEAT—*Edwin L Wiegand Co, Pittsburgh 8, Pa.* 32-page booklet, "101 Ways to Apply Electric Heat" illustrates and describes methods of heating liquids, air, gases, machine parts, process equipment with Chromalox heating units.

20 WELDING JIGS & FIXTURES—*Reed Engrg Co, Carthage, Mo.* 16-page general catalog covers complete line; includes data on new machines particularly designed for the tank fabrication field.

21 SPOT WELDING GUN—*Air Reduction Sales Co, New York 17, NY.* 4-page illustrated folder covers Aircospot process and equipment. Inert gas-shielded gun welds from one side only, without need for back-up plates.

22 TEMPERATURE CONTROL — *Wheelco Instruments Div, Barber-Colman Co, Rockford, Ill.* 8-page bulletin F6149 explains various types of systems, selection of sensing elements, correct use, and applications.

PLANT SERVICE EQUIPMENT

23 MAINTENANCE & STORAGE—*Red Tiger Products, Chicago 6, Ill.* 32-page catalog 1200-R illustrates variety of products, including shelving, bins, cabinets, workbenches, trucks, paint spray equipment, etc.

24 SIDE INDICATING PANEL METERS—*International Instruments, New Haven 15, Conn.* Data sheet gives performance information on miniature units, description, and specifications. Variety of meters available in ranges to meet practically every electrical measuring requirement.

25 HYDRAULIC CRANES — *Ruger Cranes, Uhrichsville, Ohio.* 1954 catalog covers line of hand-powered units, both floor and truck-mounted. Floor cranes available in models from 1000 to 6000-lb capacity. Request on company letterhead.

26 RUBBER TRANSMISSION BELTING—*B F Goodrich Co, Akron, Ohio.* 32-page catalog describes and illustrates construction features of various belts, recommended usage. Method of making Flylock belt joint, said to eliminate cause of belt failures, described.

27 CENTRIFUGAL PUMPS — *Tri-Clover Machine Co, Kenosha, Wis.* 29-page catalog 253-D offers engineering data, performance curves, capacity charts, seal application, plus proper selection and application information.

28 FORK TRUCK—*Elwell-Parker Electric Co, Cleveland 3, Ohio.* 4-page folder describes 2000-lb capacity F-26T, available in a 68-in.-lift model and an 83-in.

29 AUTOMATIC FILTERS—*Dollinger Corp, Rochester 3, NY.* 12-page illustrated bulletin 500 contains specifications, engineering, and performance data on Staynew filters in a wide range of sizes for handling any desired air capacity.

30 SAFETY SOLVENTS—*Nocon Products Corp, New York 5, NY.* Technical bulletin describes line of solvents to replace carbon-tetrachloride. Applications, uses, safety factors, specifications included.

31 FIRE RESISTANCE RATINGS—*National Board of Fire Underwriters, New York 38, NY; Chicago 6, Ill; San Francisco 4, Calif.* 48-page pamphlet, a revision of Appendix A of the National Building Code, contains tables on ratings of beam, girder, and truss protections; ceiling constructions, column, floor, roof, walls and partitions.

PARTS AND MATERIALS

32 TUNGSTEN MOLYBDENUM—*C Tennant, Sons & Co, of New York, New York 17, NY.* 17-page booklet gives physical properties, chemical-reagent reactions, rod and wire specifications, electrical resistance, sheet tolerances, and constants.

33 TAPPING SCREWS — *Townsend Co, New Brighton, Conn,* 8-page booklet gives detailed description of seven types of screws which form their own threads as they enter various materials. Selection recommendation chart for various materials.

34 PRESSURE SWITCHES & VALVES—*Barksdale Valves, Los Angeles, Calif.* 20-page catalog 50 covers Shear-Seal valves for manual control of vacuum or pressures up to 6000 psi. Includes four-way, dual-pressure selector, and shut-off models for pipe sizes up to 1¼ in. Useful ranges of diaphragm, bourdon tube, and piston-actuated pressure switches are tabulated.

35 MEEHANITE CASTINGS—*Meehanite Metal Corp, New Rochelle, NY.* 48-page bulletin 45, "Meehanite Castings for Pressure Tightness" has 64 illustrations of specific industrial applications demanding absolute density, uniformity, and resistance to various pressure ranges. Includes engineering property charts and pressure casting design suggestions.

36 AIR VALVES—*Mechanical Air Controls, Detroit 27, Mich.* 4-page bulletin illustrates 35 varieties for control of single and double acting and allied applications.

37 MERCURY SWITCHES — *Micro Switch Div, Minneapolis-Honeywell Regulator Co, Freeport, Ill.* 12-page catalog 90 covers standard designs of switches for use in ac or dc applications providing low force and tilt motion. Dimensions, description, electrical rating, differential angle, lead wires and application types.

38 NICKELOID METALS—*American Nickeloid Co, Peru, Ind.* 24-page booklet gives data on fabrication techniques, uses and properties. Standard production techniques described.

39 HYDRAULIC CYLINDERS — *Hydro Line Mfg Co, Rockford, Ill.* 8-page catalog 53 provides description of new Series J; includes new idea in cylinder design. Mountings, tables of bore sizes, rod, body, and mounting dimensions covering most requirements included.

40 FLEXIBLE COUPLINGS—*Lovejoy Flexible Coupling Co, Chicago 44, Ill.* 20-page catalog illustrates range of types with dimensions, specifications, applications. Includes horsepower to torque conversion table.

41 HARDFACING ALLOYS—*American Manganese Steel Div, Chicago Heights, Ill.* 48-page illustrated catalog provides data on metallurgical and physical properties for four automatic and fifteen manual rods and electrodes. Charts for selection included.

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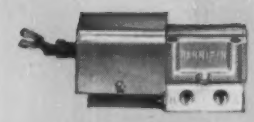
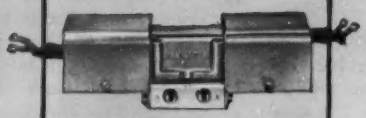


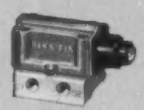
CC1-25, Solenoid-Operated Spring Return

CC6-25, Foot Operated



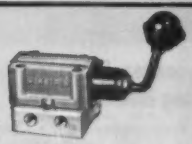
CC11-25, Solenoid-Operated Momentary Contact Type

CC7-25, Foot-Operated Locking

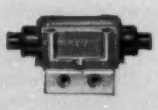


CC2-25, Ball Cam-Operated

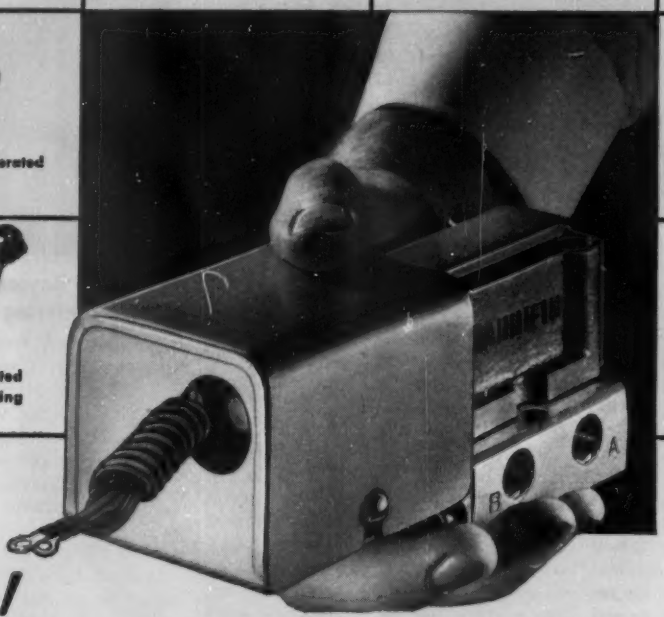
CC10-25, Piston-Operated Spring Return



CC4-25, Hand-Operated
CC5-25, (Same), Locking



CC12-25, Piston-Operated Momentary Contact Type



Now!

¼" P-M 4-Way Valves!

more compact, less expensive than any similar valves

Here's a new series of direct-operated 4-Way Valves for the control of small, double-acting air cylinders. It's the latest addition to Hannifin's revolutionary "P-M" line.

Designed for easier maintenance. The only moving part is the valve stem with its two poppets. The valve body, which contains this stem, is quickly removed from the separate "manifold" to which all pipe connections are made. Thus, the entire valve can be serviced without breaking line connections.

The CC Series. These new "P-M" 4-Way Valves, nominally of ¼" pipe size, flow so much air that they can be used competitively with other ⅜" valves when ordered with ⅜" ports. They are corrosion resistant throughout and meet J.I.C. recommendations.

Compare! You'll find these new Hannifin 4-Way Valves more compact, simpler and easier to use, and *less expensive* than any comparable valves.

GET THE COMPLETE HANNIFIN "P-M" AIR CONTROL VALVE CATALOG

The new Hannifin Controls Catalog contains complete information and specifications on all Hannifin "P-M" Valves, including this new 4-Way direct-operated series. Write for Bulletin 232.

HANNIFIN

Hannifin Corporation, 1117 S. Kilbourn Ave., Chicago 24, Ill.

Air and Hydraulic Cylinders • Hydraulic Power Units • Pneumatic and Hydraulic Presses • Air Control Valves

Ultrasonic Technique of Non-Destructive Testing

Sponsored by the Navy Bureau of Ordnance, Reed Research, Inc, has recently completed development of an ultrasonic technique for the nondestructive testing of certain nonmetallic solids. Prototype equipment, incorporating ultrasonic absorption techniques and automatic scanning, produces records of flaws or mechanical defects which were imperceptible in X-ray photographs of the same sample.

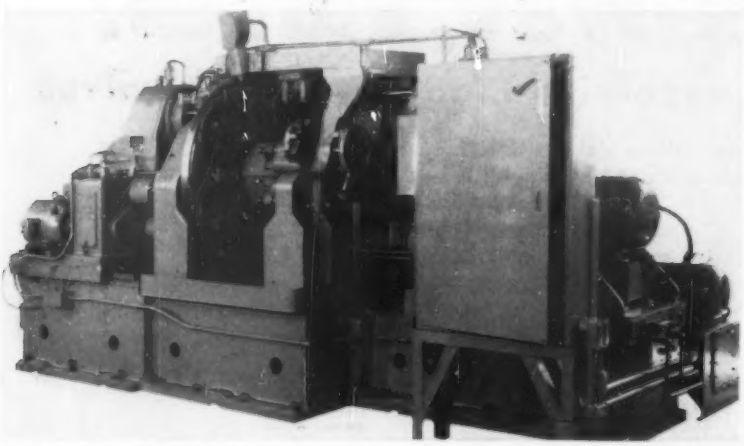
The system uses a pair of barium titanate transducers arranged to transmit and receive acoustic energy along radii of the cylindrical test sample revolved about its longitudinal axis at 100 rpm. The transducers simultaneously traverse the length of the cylinder at a rate of approximately 1/10 ipr, producing a helical scan. The entire assembly is submersed in water for good acoustic coupling. The scanning mechanism is coupled through gears to a cylindrical recording drum having the same angular velocity as the test sample.

The output from the receiver transducer is fed through appropriate electronic circuitry to a tungsten stylus held in contact with electrosensitive paper mounted on the recording drum. The resulting record or acoustigraph may be interpreted in the same manner as a positive radiograph which might be obtained by passing an X-ray source along the center perforation of a stationary cylinder wrapped with photographic film. Dark areas in both types of records represent regions of decreased transmission through the material being inspected. However, the acoustigraph can be obtained at any convenient scale. In the present equipment, a sample 14 inches long is represented by 3 inches on the record, a full revolution by 9 inches.

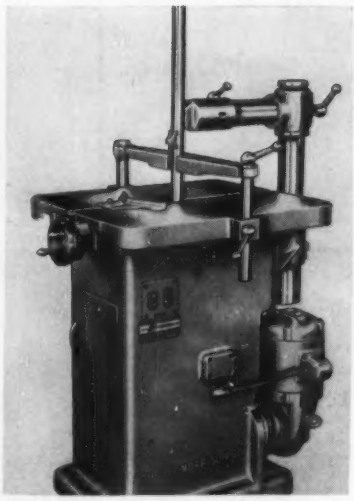
Distinctive features claimed by Reed for the ultrasonic testing method are: immediate availability of test results; inherently high sensitivity to internal mechanical flaws; easily controlled contrast and differential sensitivity; freedom from high voltage and radiation hazards; low initial and operating costs.

Reed states that although the present equipment was designed to fulfill a particular need, it is apparent that the combination of basic principles are applicable to a wide variety of inspection problems. Obviously geometric shapes such as rectangular blocks, flat plates, and thin sheets could be handled by a scanning mechanism employing translation rather than rotation. Where details of the flaw are of secondary interest relative to its presence, the system could be extended to accommodate more complicated shapes by comparing patterns in the test record with those in a standard record.

Reed Research Inc, 1048 Potomac St, N W, Washington, D C



REAR-AXLE HOUSING for tractors are drilled, spotfaced, counterbored, taper reamed, and tapped on this Moline MR132 special, two-way, three-unit, horizontal, hydraulic-feed machine. A power indexing, trunnion-type fixture with one loading station and four work stations holds the work. The machine accommodates two different types of housings of either right- or left-hand design. It has an automatic, electrically controlled operating cycle. With the work clamped, the operator pushes a button (station is mounted on side of control enclosure) to start the automatic cycle which includes: rotary indexing of fixture; rapid traverse forward of tapping head; right-hand drill and ream unit; left-hand drill unit. Production rate is 80 parts per hour — *Moline Tool Co, Moline, Ill*



Automatic Keyseater Features Include Centering and Relief

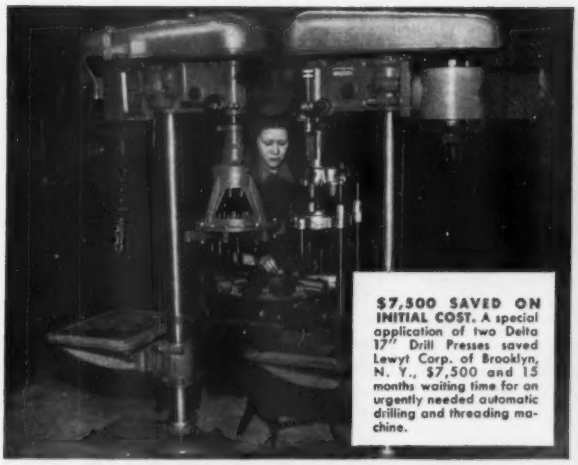
The Morrison keyseater cuts keyways from 1/16 to 1 in. with maximum length of cut of 8½ in. and length of stroke varying from 6 to 9 in. The machine operates at 25 spm; largest diameter cutter bar is 1¼ in. The distance from a 1-in. cutter to the column is 16¼ in.; maximum distance under standard clamps is 9 in.

Automatic relief backs the work away from the cutter on the up stroke, eliminating drag. Automatic centering locates the work quickly and can be set for multiple jobs of two or more pieces, automatically centering the next work piece. Single-tooth cutters of high speed tool steel are used.

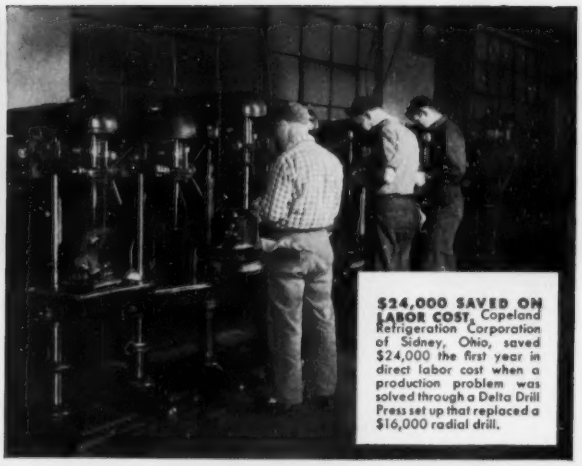
Additional features include: automatic feed to eliminate human error; automatic stop to cut off the feed for any given depth; adjustable stroke from 6 to 9 in.; automatic lubrication; use of no bushings, cutter bar being supported close to the actual cut by adjustable cutter bar support.

Morrison claims quick setup for its machine, stating that the operator has all control handles built into the machine and to change from one piece to another is simple and requires little time. Different cutter bits are interchangeable and in most cases the cutter bar does not need to be changed in order to cut different size keyseats. The motor drive and electrical equipment built into the machine include a 1½-hp geared motor, magnetic switch, and start-and-stop jog pushbutton station. Taper attachment can be supplied for cutting taper keyways. Work can be tilted either way from center.

The D C Morrison Co, P O Box 1017, Cincinnati 1, Ohio

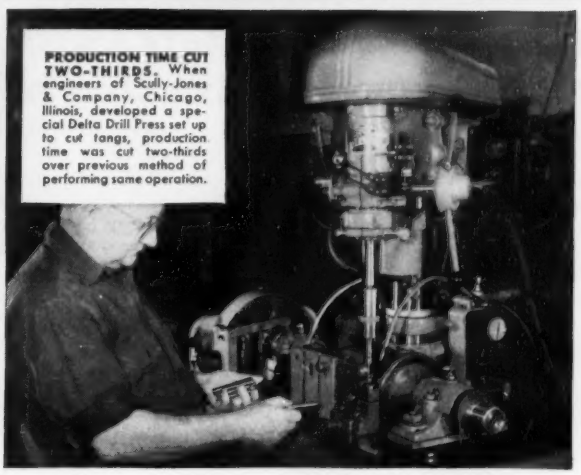


$7,500 SAVED ON INITIAL COST. A special application of two Delta 17" Drill Presses saved Lewyt Corp. of Brooklyn, N. Y., $7,500 and 15 months waiting time for an urgently needed automatic drilling and threading machine.



$24,000 SAVED ON LABOR COST. Copeland Refrigeration Corporation of Sidney, Ohio, saved $24,000 the first year in direct labor cost when a production problem was solved through a Delta Drill Press set up that replaced a $16,000 radial drill.

MATERIAL HANDLING COSTS SLASHED. Sangamo Electric Company, Springfield, Illinois, eliminated costly trucking and handling through use of Delta sectional table drill press set ups, with operator moving from one machine to another.



PRODUCTION TIME CUT TWO-THIRDS. When engineers of Scully-Jones & Company, Chicago, Illinois, developed a special Delta Drill Press set up to cut tangs, production time was cut two-thirds over previous method of performing same operation.

Four Basic Problems: ONE SENSIBLE ANSWER

(Rockwell-built DELTA Power Tools can be your answer to rising costs, too!)

If your profits are being squeezed between rising costs and stiffening competition, do what other progressive businessmen are doing. Use low-cost Delta Power Tools to supplement—and sometimes replace—heavy, expensive conventional machine tools.

Rockwell-built Delta Power Tools make possible big savings in labor, time, and material handling costs because they are so easy to move into and out of production lines, and set up in special combinations. They work to extremely close tolerances, and *stay* accurate, require a minimum of maintenance. Parts are quickly available. And Delta Power Tools are so inexpensive that they make money for their owners *even when standing idle.* They can be *kept* tooled up, saving costly set-up time.

The growing trend toward low-cost, portable, accurate Delta Power Tools amounts to virtually a "new industrial revolution"—a new kind of production thinking that is cutting costs in plant after plant. Your Delta dealer can help you cut *your* costs, too—he's listed in the classified pages of your phone book under "TOOLS" or "MACHINERY." *Delta Power Tool Division, Rockwell Manufacturing Company, 618C N. Lexington Ave., Pittsburgh 8, Pa.*

DELTA MILWAUKEE **DELTA QUALITY MAKES THE DIFFERENCE**

ROCKWELL

DELTA QUALITY POWER TOOLS

Another Product by **Rockwell**

Delta Power Tool Division
Rockwell Manufacturing Company
618C N. Lexington Ave., Pittsburgh 8, Pa.

☐ Please send me full information about Delta Power Tools, including Catalog AB-53.

☐ Please send me the name of my nearest Delta dealer.

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Company _____ Title _____

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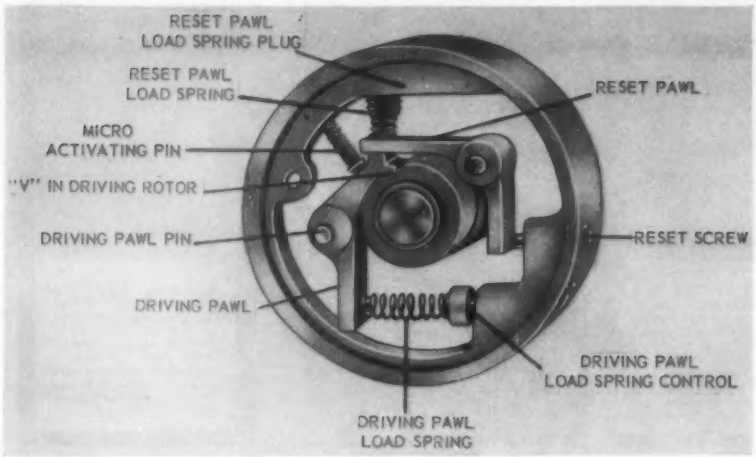
City _____ Zone ___ State. ___



Torque-Limiting Safety Clutch Prevents Power Drive Overloads

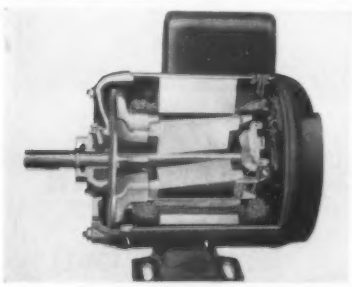
Centric Overload Trig-O-Matic clutch features instantaneous trigger action in torque limitation and is suited for speeds as low as 1 rpm, as well as high speeds. The clutch is said to be easily adapted to specific driving arrangements such as sprockets, pulleys, belts, and gears.

Operation centers about two pawls, each held in place by separate springs. Compression is controlled by the screw and plug of each. The driving pawl turns about its pin and engages in a vee in the driving rotor. The reset pawl is held in place on top of the driving pawl by a spring load that assists in controlling the action of the driving pawl.

When the predetermined overload occurs, the driving pawl slides out of the notch in the driving collar. The reset pawl engages the driving pawl in this released position and the power drive is disengaged.

Operation is resumed by adjusting the reset screw until the driving pawl is released. All Trig-O-Matic clutches will run in either direction and they are all equipped with a micro-switch activating pin for use with an external micro-switch for automatic power shut-off.

Centric Clutch Co, Route 9, Woodbridge, NJ

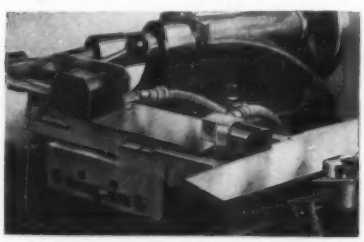


Fractional-hp Motors In Smaller Frames

Century Form F fractional-hp motors are now being produced in the rerated design. Units are said to incorporate new techniques which permit more horsepower in smaller frames.

Motor are available as Type SP-split phase, single phase, induction units for general purpose applications where load is easy to start and easy to pull up to speed; Type CS-capacitor start, single phase induction for hard to start applications, such as pumps, compressors, machines starting loaded; Type SC-squirrel cage polyphase (3 or 2 phase) induction motors for all general purpose applications.

Century Electric Co, St Louis, Mo



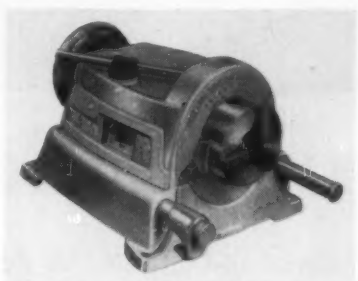
Lehigh Tracer Tool for Medium-Size Lathes

Lehigh Model M 1500 profile tracing tool is a duplicating attachment adaptable to medium-size lathes such as those in the 16- to 24-in. size range. It is all mechanical. The lathe compound is removed and the tracer tool is mounted directly on the cross-slide. A mounting pedestal is not normally required, but furnished when needed.

The tool has a horizontal slide operating between two rows of ⅜-in. pre-loaded ball bearings. Positive contact between the stylus and a ¼-in. templet is provided by air pressure applied through a pressure regulator and four-way valve. An additional feature is a rotary stylus with positive wedge lock to permit the crossfeed screw to be set in one position and not moved while successive production pieces are machined. The T-slot on top of the tracer-tool slide will accept either a standard toolpost, a square turret, or a quick change toolholder.

Lehigh reports that test runs were made taking ⅜-in. cuts with 0.030-in. feed on Nitralloy bars. Stroke of the tool is 4 in. permitting diameter changes of 8 in. to be turned; 90° shoulders in the direction of feed can be turned either externally or internally. Internal or external threading, straight or tapered, can be made with a single pointed tool. Facing is done by rotating the tracer tool so that it is perpendicular to the cross-slide. Contours of various types can be turned as can blended radii.

Lehigh Foundries, Inc, Air Control Div, 1500 Lehigh Drive, Easton, Pennsylvania



Toledo 88 Power Drive Operates Hand Pipe Tools

Toledo 88 power drive, designed for fast, efficient operation of hand pipe threaders, cutters, and reamers, converts hand tools to power.

Aluminum housing reduces weight to 140 lb. Capacity: ⅛ to 2-in. pipe, ¼ to 1½-in. bolts; with universal drive shaft, geared dies stocks and cutters up to 12 in.

Features include: 3-jaw scroll chuck on front with six pinions for greater convenience; rear chuck, universal centering; universal motor, ½ hp, forward and reverse, 25 to 60 c, ac or dc, 110-v light socket. Reducing gears are sealed; only occasional lubrication is required.

Toledo Pipe Threading Machine Co, Toledo, Ohio

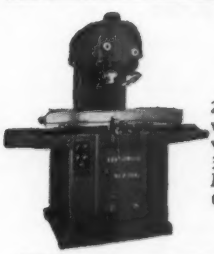
CUT MILLING COSTS WITH

KENT-OWENS

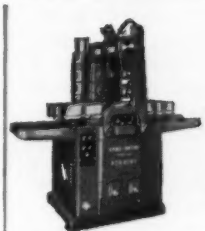
Speed and Accuracy!

More and more—Kent-Owens Machines get the call for countless milling jobs today—because they're *rugged . . . simple . . . versatile.* Twin-post head mounting assures balanced load. Greater cutting efficiency—only two gear contacts, motor to cutter. Write for bulletins on wide range of hydraulic and hand-operated machines. Also, let our engineers help you with tooling and special machine requirements. Kent-Owens Machine Co., Toledo, Ohio.

No. 2-20
20" table travel . . . 42" x 12" table . . . full automatic hydraulic table feed.



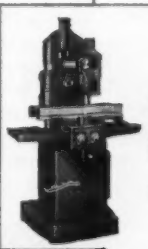
No. 2-20V
20" table travel... vertical spindle with speed range 32 to 1284 R.P.M. . . . 42" x 12" table.



No. 2-20DS
Double Spindle for two milling operations at same time . . . 20" table travel . . . 42" x 12" table.

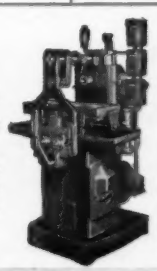
No. 1-14DS
Double Spindle for two milling operations at same time . . . 14" table travel . . . 32" x 9" table.

No. 1-M
Hand feed to table and head . . . 25" x 9" table . . . Adjustable head counter-balance.



No. 1-V
Hydraulic vertical head feed . . . 5½" head travel . . . 25" x 9" table.

No. 1-8
8" table travel . . . 25" x 9" table . . . automatic hydraulic table feed.

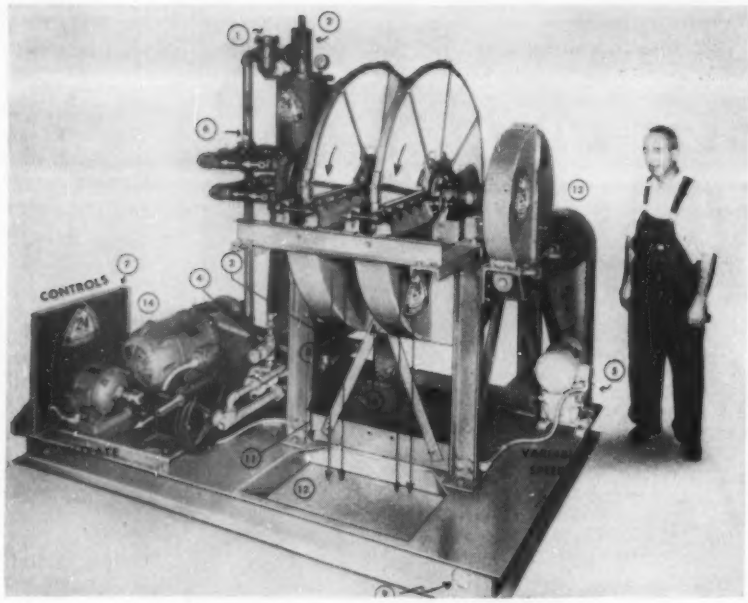


No. 1-14
32" x 9" table . . . 14" table travel . . . hydraulic table feed . . . full automatic cycle.

Call on KENT-OWENS for milling machines

KENT-OWENS REPRESENTATIVES

BOSTON
General Machinery Corp.
BUFFALO
Don W. Patterson
CHICAGO
Four States Mach'y Company
DALLAS
Hunter Machine Tool Co.
DAYTON
C. H. Gosiger Mach'y Co.
DETROIT
A. C. Haberkorn Mach'y Co.
FT. WAYNE
Ottis Machinery Co.
GRAND RAPIDS
Joseph Monahan
HAMILTON, ONT.
F. F. Barber Mach'y Company
HARTFORD
Harrington Machinery, Inc.
HOUSTON
Oliver H. Van Horn Co., Inc.
INDIANAPOLIS
Ottis Machinery Co.
KANSAS CITY
Richman Machinery Co.
LOS ANGELES
Germain Mach'y Co.
MILWAUKEE
Four States Mach'y Company
MINNEAPOLIS
The Sanderson Company
MOLINE
John J. Normoyle Co.
MONTREAL
F. F. Barber Mach'y Co.
NEW ORLEANS
Oliver H. Van Horn Co., Inc.
NEW YORK
Harrington-Wilson-Brown Company
PHILADELPHIA
Calco Machinery Company
PITTSBURGH
Bunce Machinery Company
ROCHESTER
F. W. Schiefer Machinery Co.
SAN FRANCISCO
C. F. Baloni Machinery Co.
ST. LOUIS
Blackman & Nuttall Mach'y Co.
Clarke Equipment Company
SYRACUSE
J. F. Owens Mach'y Company
TORONTO, ONT.
F. F. Barber Mach'y Company
WINDSOR, ONT.
F. F. Barber Mach'y Company



Denver "Packaged" Filter Unit Uses Wet Vacuum Pump

This Denver filter unit has all dewatering elements located on one base. Use of wet vacuum pump eliminates moisture trap with extensive overhead piping. Dimensions for unit shown are: width 5 ft 8 in., 9 ft 10 in.; height: 7 ft 10 in. As many as five disks may be used; each additional disk increases length of unit by 14 in.

The manufacturer lists the following features: sediment trap to protect pump; spring-actuated float valve to break vacuum seal if filtrate level gets too high; valve in balance line prevents vacuum from escaping through filtrate pump line on starting; "blow-back" pressure regulated by valve in pressure line; variable speed motor on filter; loss of starting vacuum through disks above pulp line eliminated with filtrate line valve; check valve to prevent leakage when receiver tank is empty; partitions can be placed in filter tank; disconnecting filter requires only disconnecting water and electrical leads.

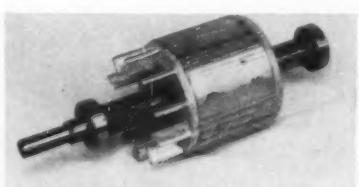
Denver Equipment Co, 1400 Seventeenth St, Denver 17, Colo

Lightweight Magnetic Pump For Circulator Applications

Dynapump, a magnetic pump for circulator applications, is said to be exceptionally quiet, and has no shaft seal or motor bearings requiring service. Compact, lightweight unit gives unusually high heads of 24 ft, making it particularly adaptable for radiant and baseboard heating jobs.

Since all pump parts are of corrosion-eliminating stainless steel, it is adaptable to either fresh or closed water systems. One standard unit accepts interchangeable flanges from ¾ to 1½ in., and carries a two-year warranty.

Fostoria Pressed Steel Corp, Fostoria, Ohio



Constant Speed Motor

Absolute constant speed under all load conditions is said to be obtainable from a reluctance-type, synchronous motor being marketed by Kurz & Root.

Because of a new rotor design, the Relsyn motor reportedly provides improved performance over the ordinary reluctance models. Rating for rating, it is about the same size as a squirrel cage unit, and operates at only slightly lower power factor and efficiency; it is available in higher ratings than ordinary reluctance motors.

Stator is essentially the same as in ordinary synchronous motors, but is of simpler, more rugged design. It has no excitation winding, slip rings, or brushes. Squirrel cage of cast aluminum provides necessary torque for starting. During operation at synchronous speed, torque is produced entirely by interaction of the rotating magnetic field of the stator winding with the iron parts of the rotor, with squirrel cage acting as a damper winding to prevent hunting. Units start under full voltage, using standard induction controls, which provide full protection to motor. On ac-to-ac motor-generator sets, the Relsyn drive holds output frequency constant over the entire load range without any complicated controls.

Kurz & Root Co, Appleton, Wis

Syncrogear Equipped With Explosion-Proof Motor

Right-angle Syncrogear, with explosion-proof motor, is available for use in locations where dangerous fumes, flammable gases, explosive substances, or combustible dusts may exist. Available in 1-hp rating, with speeds from 45 to 155 rpm, the 3-phase ac motor is designated Type SESV-GW. Explosion-proof unit is designed to comply with Underwriter's specifications for Class I—Group D, and Class II — Groups F and G.

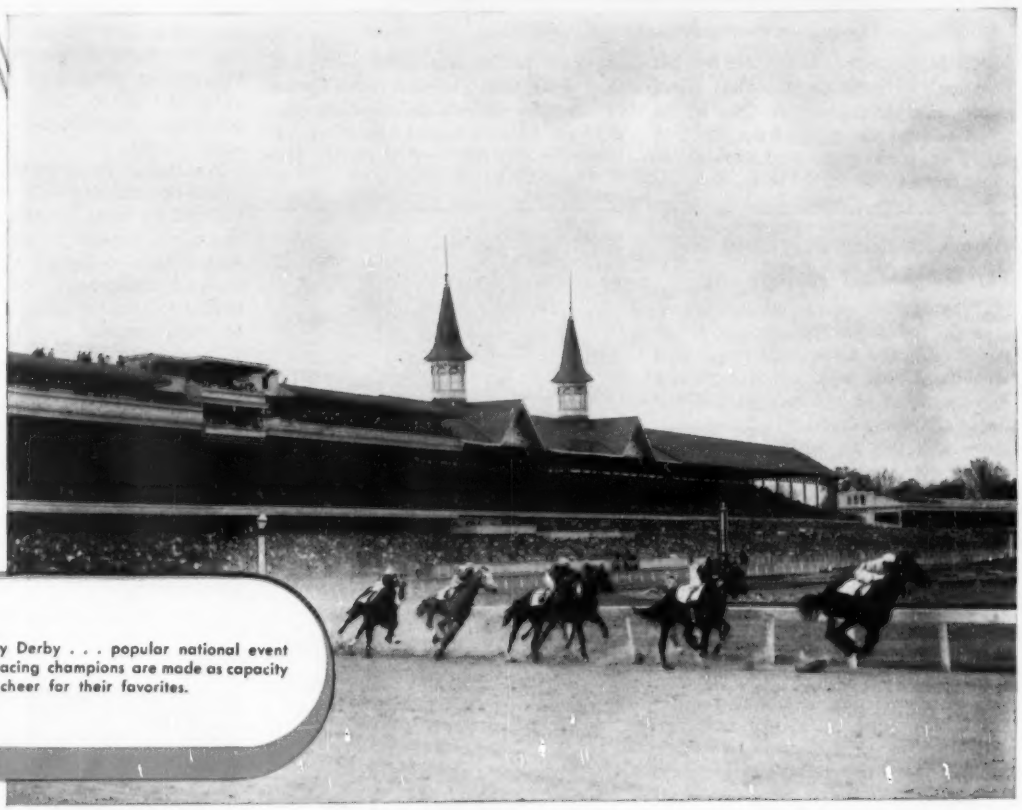
Syncrogear has a cantilever design to protect gear alignment. Mounting stresses are absorbed by the one-piece base, freeing the gear and motor housing of distortion. Splash lubrication, hardened and ground worm, normalized castings, and asbestos-protected windings are incorporated.

Additional right-angle Syncrogear motors of the US line include a combination Varidrive for variable speeds, a footless model for direct connection to driven machine, and a single-phase unit equipped with capacitor. Available from ¼ to 3 hp, with speeds of 20 to 155 rpm, and ratios up to 58:1.

US Electrical Motors Inc, Box 2058 Terminal Annex, Los Angeles 54, Calif

LOGAN . . . a national participant in major fluid power advancements

SINCE 1916



Kentucky Derby . . . popular national event where racing champions are made as capacity crowds cheer for their favorites.

LOGAN AIR-DRAULIC® FEED-CONTROLLED CYLINDERS

POWER MOVEMENTS IN ANY DIRECTION — NO POWER UNIT REQUIRED

COMBINES

the fast-acting, economical low pressure operation of

AIR

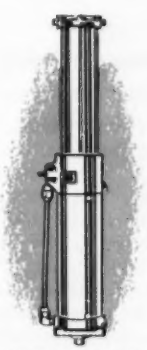
with the smooth, uniform controlled regulation of

OIL

5 ***STANDARD MOUNTING TYPES***

Standard bores from 3" to 8". Any stroke to 5 feet. For air pressures to 150 p.s.i.

Furnished for controlled feed with rapid return in either direction, or with controlled feed in both directions. Skip-feed movement can also be provided.



Air-Draulic Cylinder with Flange Mounting at Rod End

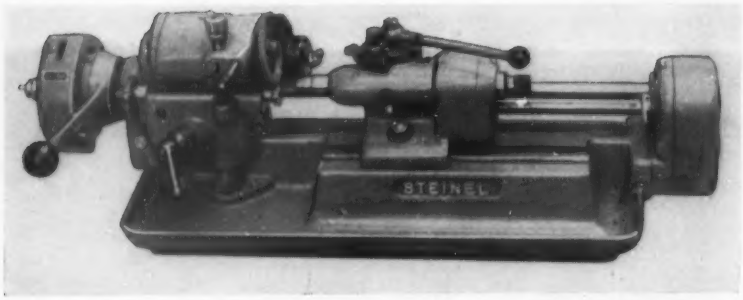
LOGAN MANUFACTURES 6,975 STANDARD CATALOGED ITEMS

FREE CATALOG ON REQUEST

AIR CONTROL VALVES, Cat. 100-4 • AIR CHUCKS, Cat. 70-1 • AIR CYLINDERS, Cat. 100-1 • AIR-DRAULIC CYLINDERS, Cat. 100-3
AIR and HYDRAULIC PRESSES, Cat. 51 • COLLET GRIP TUBE FITTINGS, Cat. 200-5 • HYDRAULIC CONTROL VALVES, Cat. 200-4
HYDRAULIC CYLINDERS, Cats. 200-2; 200-3 • HYDRAULIC POWER UNITS, Cat. 200-1 • SURE-FLOW COOLANT PUMPS, Cat. 62

SAVES TIME — Logan AIR AND HYDRAULIC EQUIPMENT — EFFORT-MOTION

LOGANSPORT MACHINE CO., INC., 818 CENTER AVE., LOGANSPORT, IND.



PIVOT BURNISHING MACHINE finishes bearing surfaces on spindles, pivot shafts, and drive journals. One model handles work diameters from 0.019 to 0.078 in., another handles work diameters from 0.039 to 0.314 in. Burnishing can be accomplished with tool steel disks, which remove metal faster, or tungsten carbide disks, which give a better finish — *Imported by Morey Machinery Co, Inc, 383 Lafayette St, New York 3, NY*

Aluminum Alloy Developed For Weight-Cost Savings

Harvey Aluminum has created a general purpose aluminum alloy designated 66S, said to provide important structural cost and weight savings. Development of 66S bridges the gap between lower strength of 61S type alloy and the higher strength hard alloys, 24S and 14S. Harvey's research laboratory states its objective as obtaining a basic wrought aluminum material combining the cost advantages of 61S with the strength characteristics of 24S.

A typical example of the effective use of the new alloy is in the truck and trailer industry.

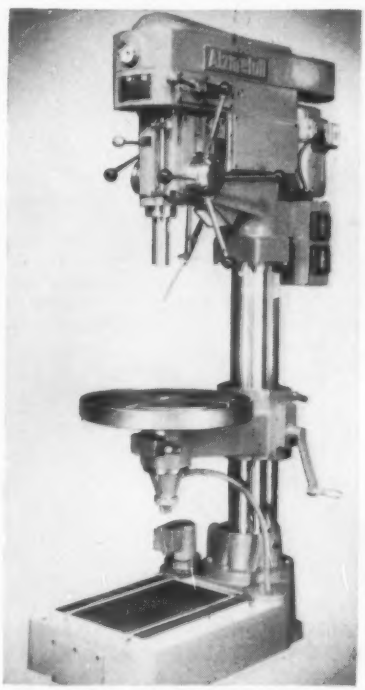
Characteristics of the alloy are similar to that of 24S in yield strength; fabricating characteristics identical with that of 61S; corrosion resistance similar to 61S; tensile and yield strengths 31% over 61S.

Harvey Aluminum Co, Torrance, Calif

Lightweight Polishing Head Reaches Small, Concave Areas

Two-pound, portable Vonnegut polishing head for contour finishing of metal, wood, plastic, or ceramic pieces, has twelve brushes and twelve 1½-in. wide abrasive strips; diameter of 6½ in. Head requires less power than the larger 16 and 32-brush heads, permitting use of smaller power tools. Variety of adapters permits application to any small power tool up to 3500 rpm. Small diameter of the twelve-brush head facilitates entrance into concave areas of smaller radii than can be reached with larger units; action forces the abrasive into contours.

Grinding & Polishing Machinery Corp, 2530 Winthrop Ave, Indianapolis, Ind



Geared Head Drillpress is Roller Bearing Spindled

Alzmetall Model AB4, column-type precision drilling machine, has a capacity of 1¾ in. in cast iron and 1⅜ in. in steel. The machine incorporates magnetic starting, infinitely variable control of spindle speed in both high and low range, automatic feed, and optional equipment including automatic tapping.

Spindle speed ranges from 80 to 700 rpm; automatic feeds are 0.004, 0.007 and 0.012 ipr. The No. 4 MT spindle has a travel of 6⅞ in.; swing is 27 in.

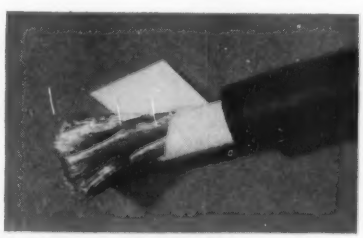
Features include: completely enclosed headstock; all gears running in oil bath; ground quill and honed housing; splined spindle made of special steel, hardened and ground, mounted on precision ball and roller bearings; automatic spindle balance to eliminate backlash; ground column with 6⅜-in. diameter.

Preselection of spindle speed range (low 80 to 240 rpm; high 240 to 700 rpm) is effected by a lever actuating a two-step change-gear transmission. The infinitely variable speed control, regulated by lever while machine is in motion, is accomplished by changing the effective diameters of a double pulley connected by a V-belt between motor and geared transmission. A tachometer indicates the exact speed.

Additional features include: standard 3-hp, 220/440 volt, 60-cycle motor; all controls located within easy reach of operator; ribbed base with cast T-slots, designed to function as coolant reservoir; coolant pump bolted to base; choice of rectangular or rotary-round swing-aside table; focused spotlight.

Optional equipment: electrically controlled coolant system; magnetic reversing control to reverse the direction of spindle rotation; automatic tapping arrangement; pedal switch for emergency control of tapping operation. In addition, the drillpress can be supplied with motors which will provide spindle speeds other than standard.

Alzmetall, United States Office, 30 Church St, New York 7, NY



Neoprene Jacket Adds Durability to Welding Cable

Neoprene compound used in the jacket of all-purpose arc welding cable has high resistance to heat, hydrocarbons, oils and greases, and acid attack. The special compound was chosen to provide greater durability under severe service conditions.

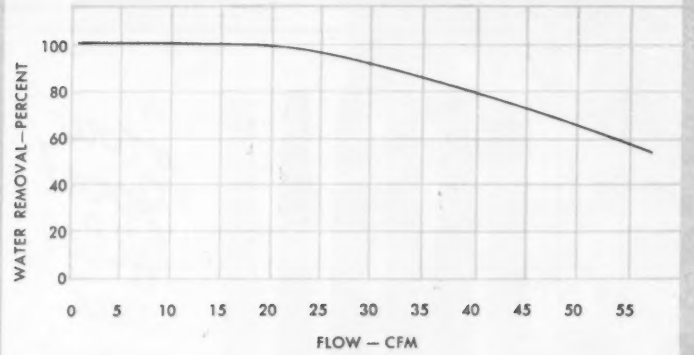
Conductor is composed of fine, pure copper wires, stranded for extra flexibility; strong paper separator is thin enough not to impair flexibility. Cable is packed in 250-ft coils or 1000-ft reels; furnished in sizes from No. 6 to No. 4/0.

Dalweld Co, 1 Bertel Ave, Mt Vernon, NY

PERFORMANCE DATA PROVE

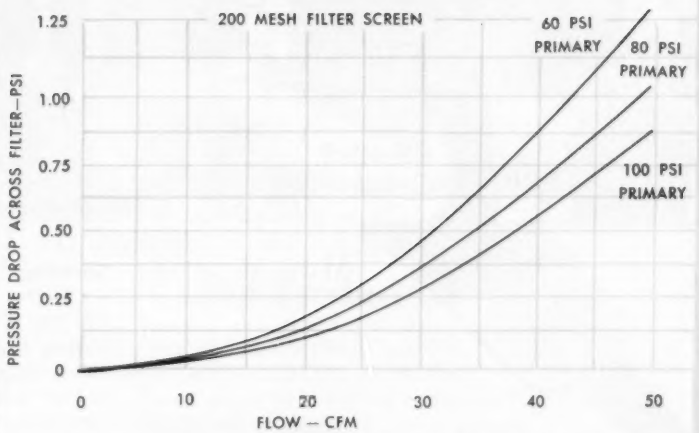
Norgren Automatic-Drain Filter's

HIGH EFFICIENCY IN MOISTURE REMOVAL



operates whether air pressure is constant or fluctuating, whether or not air is flowing.

LOW PRESSURE DROP



Filtering the air that powers your tools, cylinders and other pneumatic equipment is essential if you want better equipment performance and more output with lowest maintenance costs.

The new transparent bowl Norgren Automatic-Drain Filter gives you this vital protection automatically, whether air pressure is constant or fluctuating, whether or not air is flowing...assures clean, dry air under all conditions, without attention. Flow: 0 to 35 cfm; pressure; 30 to 150 psi; temperature: 40° to 120° F.

Drain operates automatically, but discharges only under full load to reduce wear and loss of air.

WRITE FOR NEW CATALOG No. 600

C. A. Norgren CO.
3436 So. Elati, Englewood, Colo.

PIONEER AND LEADER IN OIL-FOG LUBRICATION FOR 26 YEARS

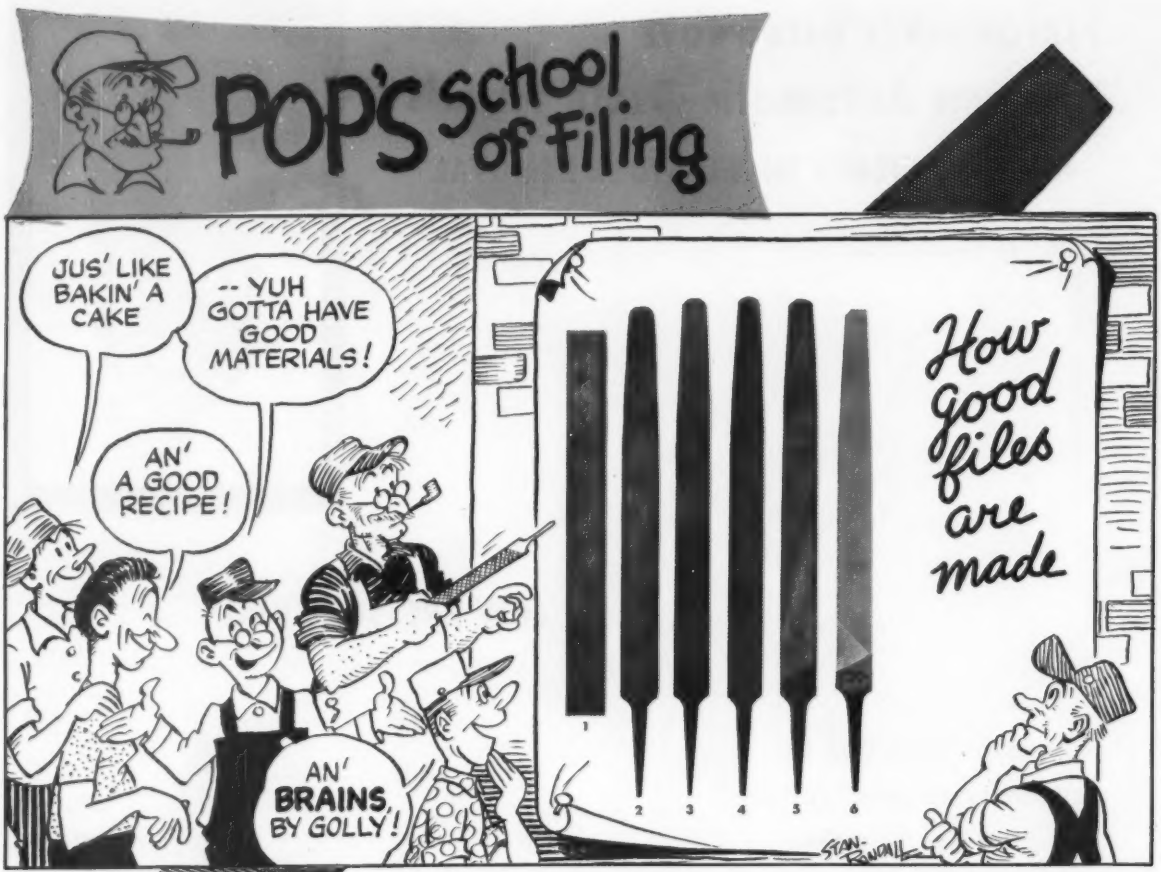
Valves • Filters • Regulators • Lubricators • Hose Assemblies

New transparent replaceable bowl filter for ¾" and 1" air lines. Water capacity 1 pint.

Replaceable metal bowl filter for ¼", ⅜" and ½" air lines.

Permanent metal bowl filter types for ¼" to 1½" air lines.

New, small replaceable bowl filter for ¼" and ⅜" air lines. Screw type clamp ring.



Making files of high and lasting quality, and of correct design for use on various kinds of materials and products, is a *science*. Nicholson manufacture goes far beyond the factory walls. It extends to the metallurgical laboratory, to the steel mills, to industrial plants where files are in constant or diversified use. Briefly, the steps embrace these important factors:

Steels are usually made to exacting specifications; come in bars of various cross-sections; are analyzed and tested; cut to working length (1).

Forging, with trip hammers, rollers and punches, shapes the body, point and tang into a "blank" (2).

Annealing, by heating that is laboratory-controlled for both degree and length, "conditions" the steel for uniform texture and for cutting.

Smoothing involves straightening the annealed blank, grinding to remove scale, and drawfiling to assure uniform teeth and even filing surface (3).

Cutting is done by Nicholson-perfected chisel-operating machines considered the most precise and efficient of their kind in the world. First operation (4) produces the overcut (single); second (5) the upcut.

Hardening is achieved under highly scientific processes and controls to assure teeth that are strong and hard yet not brittle.

Finishing (6) includes such important details as: cleaning and sandblasting for extra sharpness of teeth; softening the tang; oiling to prevent rust; final-testing and checking to assure the most efficient, uniform and long-lasting files human skill and earnestness can produce.* That's why—

Industrial Distributors are proud to offer you Nicholson or Black Diamond files

*FREE 48-PAGE BOOK, *"File Filosophy," tells lots more about the manufacture, kinds, use and care of files.* **Send for it.**

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NICHOLSON FILES *FOR EVERY PURPOSE*

ROUND TABLE Discussion

SUPER SALESMAN

How much leeway should the salesman be allowed in the shop? Once he has gained the foreman's confidence, should he be permitted to talk individually to the workers, or must his visits always be supervised?

IT IS UNFORTUNATE that certain qualities of salesmanship sometimes go against the grain of many shop supervisors who are not cut off the same stick. The selling of any item, it makes no difference what, requires a certain amount of high pressure—pressure applied to make you think, if not believe, that the item is the best ever put in use. In doing this selling job it is always easier if one has a big audience, since someone will either know about the item or was favorably impressed previously. Thus they will help convince others of the worth of the item being sold.

Tool peddlers, as our machine tool salesmen are often called, are no exception to the salesmen category. There are good and fair ones when rated against technique used to make their wares attractive to purchasing agents and supervisors.

Sales Departments are trying to use men who have some engineering background to sell products that require an engineering approach. It is certainly very unfortunate that the combination of a good engineer and a good salesman is a rare one. They usually are like oil on water and do not mix well. So we have either a good salesman with a smattering of engineering trying to sell a product and resorting to high pressure technique, thereby endeavoring to create an impression that he knows the answers, or we have a good engineer, but a poor salesman, letting the product stand on its own merits based on performance. Both will pay off for the right company. Now since companies usually employ men of the above types, they have within their own organization policies covering the salesmen who call daily on the company.

Much can be lost by the abrupt, harsh, attitude which many companies employ in handling salesmen. Whether the man is a good salesman or an engineer—he is first a person and is trying to make a living. He should be treated with respect. Sales work is not easy—even

an ACCO product

Wilson "ROCKWELL"* Hardness Testers

NOW you can own the BEST for only $550 (less accessories, F.O.B. Bridgeport)

3-JR MODEL

6 Features for Tool Room and Production Testing

This Model 3-JR WILSON "ROCKWELL" Hardness Tester is proving invaluable for tool room use and most production testing. It will pay for itself many times over by eliminating costly complaints from your customers.

These features make for accuracy and long life—

1 Totally enclosed dirt and dustproof "Zero-minder" dial gauge.
2 Enclosed, easy-to-reach, variable speed dash pot.
3 All controls conveniently grouped.
4 Gripsel clamp screw for quick change and proper seating of penetrator.
5 Stainless steel elevating screw.
6 Standardized weights.

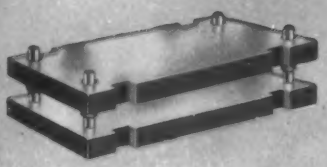
No matter what your hardness testing requirements, there is a WILSON "ROCKWELL" Tester to meet it. They are in two types—Regular and Superficial. They are in many styles with accessories for testing flats, rods, rounds and odd shapes. Ask about the WILSON TUKON for micro-indentation testing. Write us for complete information and recommendations.

*Trade Mark Registered

ACCO Wilson Mechanical Instrument Division
AMERICAN CHAIN & CABLE

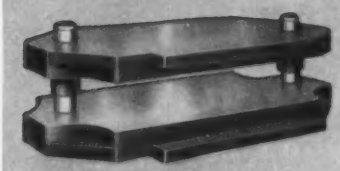
230-B Park Avenue, New York 17, N. Y.

Specify DETROIT
for any type of die set



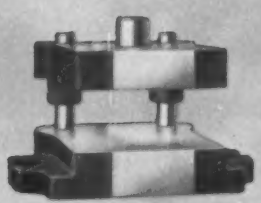
Special ALL-STEEL DIE SETS

. . . any type or size of die set, factory-built, factory-assembled and factory-tested to meet the most exacting specifications.



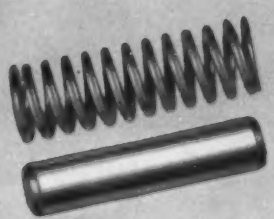
Special SEMI-STEEL DIE SETS

. . . using premium castings, formulary-controlled for high tensile strength, good machining qualities and exceptionally long life.



Stock PRECISION & COMMERCIAL SETS

. . . both types available in regular, long narrow and reverse styles in all standard sizes, ready for immediate shipment.



Precision-BUILT ACCESSORIES

. . . a wide range of high-quality supplies, built to Detroit's precision standards, ready for immediate shipment.

Detroit DIE SET CORPORATION

2895 W. GRAND BLVD.
DETROIT 2, MICHIGAN

Call "Detroit"

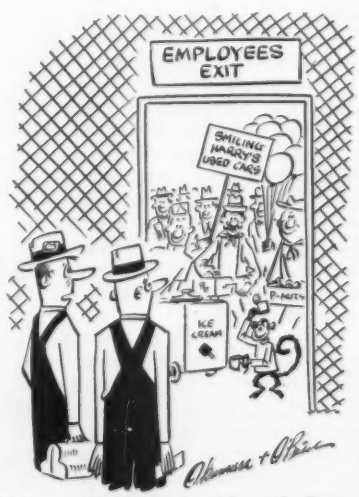
DETROIT	TR 2-5150	FLINT, MICH.	5-7361	NEWARK	MA 2-4318
BALTIMORE	PL 2-4641	GRAND RAPIDS, MICH.	3-1895	NEW ORLEANS	RA 6528
BIRMINGHAM, ALA.	3-1341	GREENSBORO N.C.	4-7655	ORLANDO, FLA.	2-3747
BUFFALO	CI 0163	INDIANAPOLIS	HU 5604	PHILADELPHIA	VI 4-4084
CHICAGO	PU 5-0500	KANSAS CITY, MO.	VI 3558	PITTSBURGH	LO 1-4011
CINCINNATI	HU 7775	LOS ANGELES	AD 7251	ROCK ISLAND, ILL.	8-2814
CLEVELAND	TO 1-0860	MILWAUKEE	GL 3-7170	ST. LOUIS	FR 6811
DALLAS	TE 5029	MINNEAPOLIS	OR 5-7980	SEATTLE	EL 6644
DAYTON	HE 3042	MONTREAL, CAN.	GL 6126	TOLEDO	MA 4510
DECATUR, ILL.	8-3474	NASHVILLE	6-2597	TORONTO, CAN.	KE 2972
DENVER	SH 2451			WASHINGTON D.C.	AD 4-5700

if many people think differently.

Usually it is better to have a purchasing agent screen all salesmen. This reduces loss of time by the production supervisor. Again this sometimes means that a company misses golden opportunities to use new products. The purchasing agent must be a person with the knowledge of what is needed in the shop. He should not be just a man who buys what he is told to buy. A good purchasing agent knows the business and what is required to operate it. Details, no —but in general, yes. When salesmen come in who have products that look interesting and new, these men should be turned over to the right production supervisor to talk with.

We want to know if demonstrations on the production are needed and if they should be allowed. This is, or should be, the right of the foreman to decide. After an office discussion with the salesman, the material can be demonstrated if desirable. True, a salesman can help in passing out ideas, but they should be to the foreman, not to the workers in general. Naturally, if the foreman desires, he can turn the salesman loose. That is his privilege, but until the foreman is pretty certain of his salesman, it is not a wise move.

Salesmen with a product superior to others do not have to rely upon underhand tactics to sell. They give out items for advertising. It is part of a planned company program. But most good salesmen know their place and know that their product must perform if they are to stay in business. So when a fellow like Ed who apparently just opens up the shop to all who would enter comes along, it is a salesmen's paradise. They can make lasting impressions on workers who know no better than to swallow



"I guess they know when it's payday!"

Plain Pointers on Projection

MOST optical textbooks mention the French physicist Augustin Jean Fresnel in connection with his work in helping to establish the wave theory of light. However, Fresnel also contributed greatly to the design of optics used for lighthouses. His work in this field, which forms the basis upon which lighthouse opticians still work, has led to the coupling of his name with a distinctive "flat" lens type.

At first glance this might seem removed from the field of optical gaging and the use of contour projectors throughout industry. The truth of the matter is, however, just the opposite. In designing the Kodak Contour Projector, our optical engineers have included a Fresnel lens directly behind the instrument's ground-glass screen.

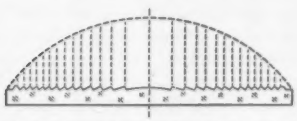


Fig. 1. Steps of the Fresnel lens duplicate the curvature of conventional condensers, making it possible to "collapse" a lens into a flat plane.

This flat plastic lens is illustrated schematically above (Fig. 1). In effect, a curved surface is collapsed into a series of minute steps which reduce the mass of the lens to a practical size. A conventional lens used for the same purpose, of diameter to equal the projector screen, would be more than 5" thick, heavy, and not inexpensive.

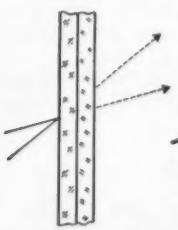


Fig. 2. Diffusing properties of ground-glass screen scatter oblique light away from viewer's eye.

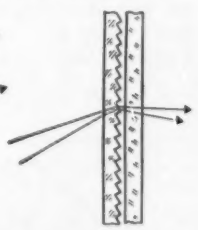
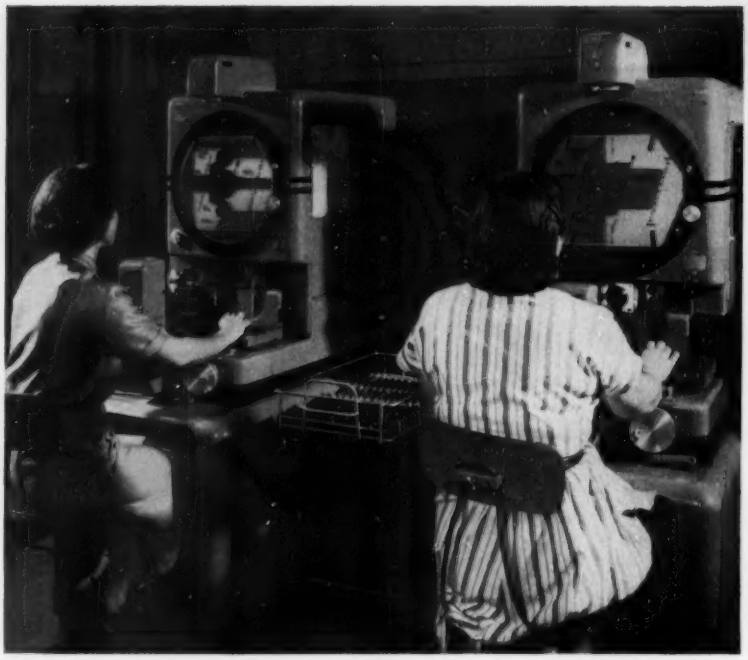


Fig. 3. Fresnel lens behind ground-glass screen directs oblique light towards viewer.

Use of the Fresnel lens in this manner serves a double purpose: 1) it effectively increases screen brilliance by directing the light on the screen directly at the operator's position; and 2) it provides even illumination over the entire screen area.

Because of this our projectors may be used under normal shop illumination without hoods or curtains—both of which sometimes tend to give a feeling of claustrophobia. In addition, the over-all screen brilliance makes possible easy reading of critical tolerances at any point on the projector screen. Together, these attributes tend to make your personnel more contented and efficient . . . help to make contour projection suited to mass inspection needs.

(Advertisement)



How rapid, accurate inspection on Kodak Contour Projectors keeps a production line moving

When you receive a great many precision parts from a great many suppliers, quality control checks can be a real production bottleneck.

At General Electric's jet engine plant at Cincinnati, Ohio, engineers have solved one such problem using Kodak Contour Projectors. Rotor blades arriving in lots of 2000 to 5000 are given a 4 per cent AQL check by the young ladies seated above. Eleven dimensions, including angles and radii, are checked on the dovetail contour, and 14 different dimensions checked on the rotor blade root—all at a rate of approximately 150 pieces per hour. Optical gaging has lightened the load, reduces inspection time, helps to keep the production line moving.

The Kodak Contour Projector is particularly suitable for such routine production inspection. It requires no hoods, curtains, or darkened room (the column at the left tells you why). Operators work rapidly and accurately in comfort—require little training. And, simply by changing chart-gages and staging fixtures, all sorts of complex parts, large and small, can be inspected.

To find out more about the Kodak Contour Projector and how it can work for you, send for our 12-page booklet. Or, write for details on a sound movie, "Optical Gaging."

the KODAK CONTOUR PROJECTOR

90

EASTMAN KODAK COMPANY

Special Products Sales Division, Rochester 4, N. Y.

Please send me a copy of your booklet, "The Kodak Contour Projector."

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Production More Than Doubled

by changing to a

KELLER RIVETER

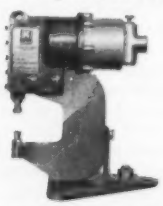
An electronic tube manufacturer boosted production from 62 to 155 pieces an hour by installing a Keller Compression Riveter in place of a kick press for staking the pins in vacuum tube bases. This 150% increase, achieved at relatively small cost, is typical of the results obtained by proper application of Keller Pneumatic Tools.

For riveting, staking, crimping, pressing, and marking operations, and for forcing fragile parts into a pressure fit, Keller Compression Riveters have the tremendous advantages characteristic of air power. They give a squeeze—not a slap—and exert maximum power only at the *end* of the stroke. This reduces shock and spoilage from cracked and broken parts.

Facts in Brief

about

KELLER Compression Riveters



- Air pressure gives a squeeze—not a slap
- Can be operated by foot valve or hand throttle
- Automatic cycle, stops at end of each cycle
- Portable, bench, or pedestal mounting
- Ideal for pressing, dimpling, staking, forcing, or riveting operations

Send for descriptive literature and detailed information

KELLER TOOL COMPANY

GRAND HAVEN, MICHIGAN

everything fed them. Actually Ed is the one in error.

Listen to a salesman. If you don't have the time, then don't set yourself up as the company contact man with outsiders. Remember, salesmen carry tales and one of the most damaging is the tale about how nasty Company X is to outsiders. It gets twisted and contorted, and, before many moons, the company is given a black eye in the sales field. This gradually spreads and may even prove to be disastrous to the company.

Let us sum up the problem in this manner. Salesmen have good products and good ideas. These products and ideas must be blended into a company's own methods. The blending must be done by those persons who can properly mix the necessary items together. The foreman is one of these people. However, no salesman should be given the run of the shop unless he is well known to the supervisor and can be trusted not to impress the workers. The product is the thing and its performance is the answer. Foremen and supervisors must take time to listen to salesmen. They must properly weigh the story and make decisions. This is part of the job which you perform for your company. Remember what you hear about Company Y someone else will hear about your company. No rights can be granted to any salesman to demonstrate unless a company policy so dictates or the individual foreman so desires it. Don't make your shop or company a testing place for all whims.

Charles D Townsend
West Hartford, Conn

new hob list

CUTTERS • BROACHES • SPECIAL TOOLS

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CICERO 50, ILLINOIS

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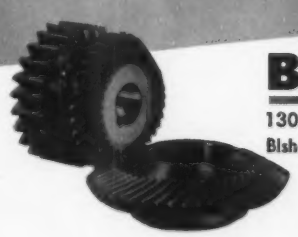
Here's the Way You Can Save Money on Gears

During the many years BRAD FOOTE has been making gears, we have accumulated a large variety of hobs, cutters, and broaches which we have used to make thousands upon thousands of gears to order. With this stock of tools, we are able to do just about any gear cutting job you may have.

By laying out your gears to be made with these tools, you can get what you need quicker . . . and cheaper

Write today on your company letterhead for a free copy of this big catalog which shows all the important specifications needed by gear designers. You'll find it convenient to use, and it will save you money on the gears you buy.

IMPORTANT NOTE: *If you now make your own gears, ask for a copy anyway. You may find that it is cheaper for us to make them.*



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10 cutting edges on one KENDEX* tool!

No tool grinding expense and *minimum* machine down time for tool changing—these are the advantages you obtain from multiple-edge Kendex "throw-away" insert tools. For example:

A Kendex round insert, used to bore 2½" cast iron stators, machined 300 pieces before one cutting edge dulled. Then, without removing the shank from the boring bar, the "button" was revolved to a new cutting position, until 3,000 stators were machined with the insert's 10 cutting edges. Best previous performance, by a conventional brazed tool, was 400 stators per tool grind.

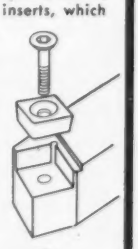
Kendex precision-ground buttons have Kennametal's high wear-resistance, for long life. Screw-mounted, they can be rotated in seconds to new cutting positions without removing or resetting the tool holder . . . a great time-saving feature. When all cutting edges are used, the insert is thrown away—replacement cost is slight compared to that of regrinding.

Only Kennametal makes Kendex "throw-away" inserts. Ask your nearest Kennametal tool representative to help you apply this cost-saving tooling to suitable operations in your plant. Kennametal Inc., Latrobe, Pa.

*Registered Trade-Marks

How KENDEX* Works

1 Hard, strong, wear-resistant Kennametal is molded into square, round, or triangular Kendex inserts, which are precision ground.



2 Kendex inserts are mounted to suitable tool holders with socket head screws.

3 When edge becomes dull, insert is turned to new cutting position. When all cutting edges have been used, insert is thrown away; no regrinding.

KENNAMETAL*

CEMENTED CARBIDE TOOLING THAT INCREASES PRODUCTIVITY

A-8

SALES OFFICES IN PRINCIPAL CITIES

THE SALESMAN WHO realizes the value of the product he is selling will not take advantage of his opportunities. He must also respect the position of the executive who is in charge of the department in which he wishes his product to be in evidence.

To resort to underhanded methods is morally wrong and will eventually backfire in having his wares looked upon as just as cheap. For the salesman to wander around among the workers for the purpose of creating a demand for his product is not exactly cricket. The traveling merchant must realize that the foreman is the one to say what should be used in his department, as it is he who is responsible for the output.

If he can't sell the department head on the superiority of his wares over other makes, then by all means he should bow to the will of values—either the value of his arguments or the values in the thing he is trying to sell. One cannot increase the value of his product by resorting to such things as bribes—innocent little bribes used primarily to influence others in boosting his product.

The salesman must be aware that the foreman is selected by his superior because of his ability to determine values—be it in men, machinery, or small equipment and tools. No salesman is going to influence him if the arguments are not backed by quality. It is the foreman whom the salesman has to convince in a few words and in as little time as he possibly can because the foreman's time is of great value. In fact, it is advisable for the salesman to arrange an appointment with the foreman so as to catch him at a time when he isn't tied down with other more important matters. A salesman who considers the time of the man he is interviewing is more likely to

"Al, tell me more about this sideline business of yours!"

WHEN IT COMES TO PRODUCTION . . .

. . . come to

HARTFORD *Special*

AUTOMATIC DRILLING & TAPPING MACHINES

THE HARTFORD SPECIAL MACHINERY CO. • HARTFORD 12, CONN.

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I'VE SEEN DOZENS DO IT-- AN' DONE IT MYSELF FOR YEARS! RIGHT AFTER SPENDING ALL MY DOUGH ON CHRISTMAS I STALKED AROUND FOR A FEW DAYS WITH A FIRM RESOLVE TO BECOME A BOSS AN' EARN MORE DOUGH!
YOU'RE JUST JEALOUS BECAUSE HE TOLD THE BULL ABOUT SOL-SPEEDI-DRI FOR THESE FLOORS! DOESN'T LEAVE YOU ENOUGH TO GRIPE ABOUT!
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Industries large and small have acclaimed Sol-Speedi-Dri the leader among oil and grease absorbents. That's because wherever slippery, dirty floors cause trouble, Sol-Speedi-Dri does a bang-up "dry-cleaning" job, covers plenty of floor area, and can be used again and again. Consistent high quality is insured by strict laboratory controls. Why not try it on your floors? Send coupon today for a free sample!

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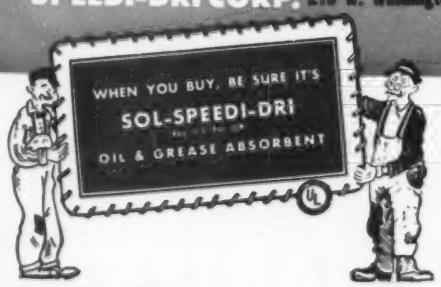

Warehouse stocks maintained in principal cities of the United States and Canada.

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Inquirers in New York, New England, and New Jersey should write to Speedi-Dri Corp. Elsewhere in U.S. to Waverly Petroleum Products Co., 1724 Chestnut St., Phila. 3, Pa. In Canada, G. H. Wood & Company Ltd., Toronto. Branches throughout Canada.

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AM-3/54

make a sale, if he can manage to get over the facts convincingly.

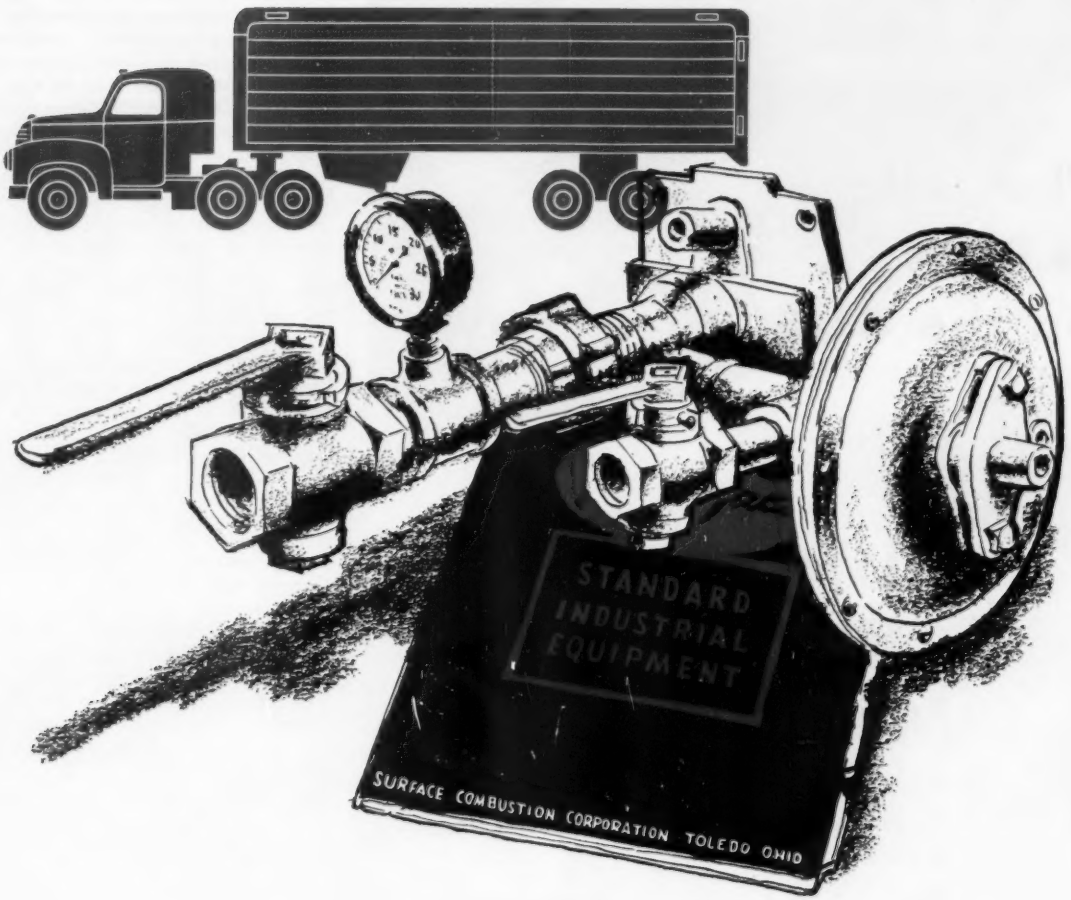
To slip around the shop to try to impress the workers with the superiority of his goods by psychological bribes in the form of nifty doodads, such as fancy cigarette lighters or fancy pencils, is, in my honest opinion, nothing short of the methods advocated by the leaders of subversive activities. It's crooked business and doesn't conform to the ethics of modern salesmanship. Any decent man will look upon it with grave disfavor. If you can't win your point through the door of honest endeavor, Mr Super-Salesman, don't try to slip through the back window in the dark and try to build yourself up by influencing the men in the shop. This is the same as saying to the foreman: "To hell with you, Mister; I'll take the matter up with your men whether you like it or not."

The territory of a shop is a private area and you, Mr Salesman, don't need to think that just because you are spruced up in a fancy suit and flashing tie you can wander around with impunity. Were you to do so, even though what you have to offer will stand the test, you're sure as hell going to have the foreman prejudiced and believe me, that will be one hurdle that will be hard to overcome. Your place is in the foreman's office if you think you have something that he should have. Don't cheapen yourself and your product by trying to pull the wool over the chief's eyes. You might be able to convince the farmer that his daughter is safe in your hands, but remember that—the shop supervisor is no hayseed and is inclined to keep a better eye on your tactics than is young Goldylocks' old man.

It is only natural for a man to be influenced when he has been given a lighter or, as often happens, a slug of good liquor. If you don't believe this, just attend some of these conventions and you'll be surprised how

"Wouldn't be a bit surprised to find out we're overloaded."

it would take a highway freighter...



to carry just one each of the 80 types and 800 sizes of Surface Combustion burner equipment! That's quite a load. It represents a wealth of combustion research and field experience with every kind of heat treating and heating application. It's a load of cost savings, too, resulting from high burner efficiency, easy installation and maintenance, simple and precise control, versatile combinations. You can take your pick from the load and find the burner equipment to meet your requirements. Write for Literature Group H53-10.

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AUTOMATIC CHUCKING MACHINE

There are no half-finished pieces lying around at the end of the day when you put your work on this outstanding machine.

The "1-2-3" feature—available only on the Goss & De Leeuw Automatic Chucker —provides the means of finish machining three ends of a part without changing set-up.

Note some of the typical parts machined. Ask for illustrated literature giving further details and send samples of your work for a cost estimate on handling it on the Goss & De Leeuw.

GOSS and DeLEEUW
MACHINE COMPANY, KENSINGTON, CONN., U.S.A.

quickly the ceiling rotates above you. Product is usually sold on its merits, not by the number of swings a chandelier makes. My slogan is, if you don't want to put yourself in a position of compromise, don't take something that is offered to you for nothing without letting the giver know that it places you under no obligation whatsoever in accepting it.

As a shop executive I would tolerate no salesman wandering around my department. He may be able to impart a little up-to-date information to the men, but that is the wrong way to do it when he could just as well do the same thing for me. Anything of an underhand nature would be a signal for me to tell him to get the hell out and stay out.

There is no earthly reason why a salesman cannot conduct himself as an honorable man and shoot straight from the shoulder. If what he is trying to sell isn't up to snuff and cannot weather the storm of competitors, then it is up to him to get with an outfit whose product is worthy of representing.

John Homewood
Tujunga, Calif

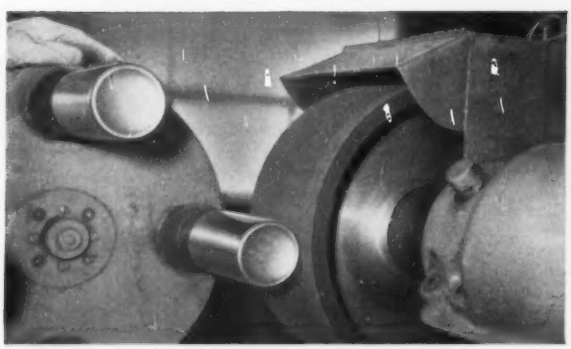
IF THE ENGINEERING SALESMAN from Garboth Grinding Wheel Co is allowed to run around putting bugs in the ears of Ed's men, then, of course, all the other grinding wheel firms ought to have the same right. And what about the twist drill sales engineers and those who sell toolbits for lathes, milling cutters, coolant fluids or machine oils? Why, that would ruin the whole production, it seems to me. It is certainly Ed's business to see to it that this never happens.

Only in special cases should the sales engineer be allowed to demonstrate his product on the shop floor, and then the foreman should be present; who otherwise should pick up the information that might be given? If any guy on the floor is designated to observe the methods or materials used, he should take notes and turn it over to the foreman; the shop would otherwise miss it if he left later.

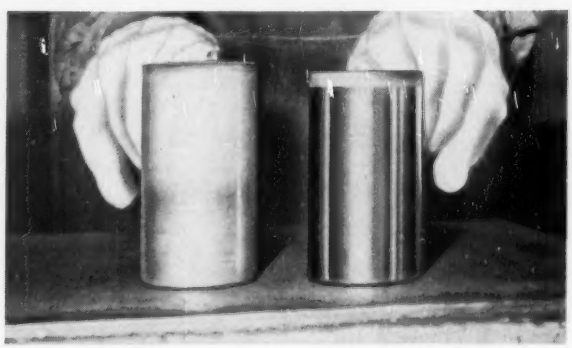
If any sales engineer can prove what's wrong with everybody else's grinding wheels he should be called a super salesman, but though I doubt he can do that, his claims should be put down on paper. After the sales engineer has left, Ed should tell one of his men to check these claims. If this fellow reports that the engineer was right, then Ed should favor the Garboth Grinding Wheel Co when further batches of grinding wheels

How would you solve it?

(1) Production Problem: To cut unit costs of grinding and polishing stainless steel whip-cream dispenser cans. Nilsen Mfg. Co. had been jobbing out the cans to an outside source, paying a high .08¢ per can, due to old-fashioned methods, labor, material and delivery costs.



(2) Solution: A 3M Representative recommended that this Addison, Illinois, manufacturer install the 3M Method, using Grit #180 Resin Bond Belts running over a special contact wheel. Cans were placed on automatic work holders.



(3) Results: An immediate reduction in polishing costs. By installing the 3M Method, and doing the work themselves, Nilsen Mfg. Co. cut costs to only $.0125 per finished unit . . . a saving of $.0675 per can! A 3M Representative can help you solve your grinding and finishing problems, too. His services are available without cost or obligation.

3M ABRASIVES

Made in U.S.A. by Minnesota Mining and Mfg. Co. General Offices: St. Paul 6, Minn. In Canada: London, Ont., Can. Export: 122 E. 42nd St., New York City. Makers of "Scotch" Pressure-Sensitive Tapes, "Scotch" Sound Recording Tape, "3M" Adhesives, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing.

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☐ *Send me free booklet: "Case History Reports on 3M Abrasive Belts"*
☐ *Have 3M Representative Call*

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55 years of lathe building experience

★ ENGINE
★ REMOVABLE BLOCK GAP
★ EXTENSION BED GAP

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"No, Pete hasn't been here 40 years — he hit the jack pot by suggesting EXL-DIE."

COLUMBIA TOOL STEEL COMPANY • CHICAGO HEIGHTS, ILL.

Producers of fine tool steels — All types immediately available through Sales Offices, Warehouses and Representatives in Principal Cities.

TOOL COLUMBIA STEELS

are purchased. If several of Ed's men favor the Garboth wheel, it is very likely that they are better than other makes.

Salesmen should not be kept out of any shop, but they should certainly talk to the foreman first and get his permission to demonstrate their stuff. This is not only best for the shop, but also for the sales engineer, because even if the salesman should be able to convince some of the guys on the floor that his product was superior to other wheels, the foreman might decide against him, and I'm sure 99 out of 100 salesman would respect the foreman's privilege to handle any sales proposition that might come up.

I don't see Al's point when he says that salesmen can do a lot of good when they come out into the plant floor. Yes, of course, but why can't they do the same thing after they have got the foreman's permission to do so? If Al has in mind that it makes no difference whether or not the foreman accepts this demonstration, he knows very little or nothing about machine shop executives' functions or mental attitude.

The break Al says the men need, is an entirely different question and should be discussed in other connections. If the men need a break every time a salesman gets around, production must suffer a severe setback. If Al does not see that, he must be new in the game or a "writing desk foreman" with very little knowledge of machine shop work.

When the wrong grade of grinding wheel is chosen for a certain job, it is up to Ed to correct the mistake. If he is not capable of doing that, as grinding is a science by itself, he should learn to do it. It would be impossible to depend upon the salesman every time a wheel should be selected for a given job. In most cases the man at the grinding machine would know what wheel to use

"Poor Franklin! He spent 20 years perfecting this ship to the moon, and now his wife won't let him go without her."

Double Duty!

KNIGHT'S NO. 50 DOES BOTH . . .

★Precision Boring
★Vertical Milling

Work transfers eliminated—setup time held to the very minimum—these are but two of the benefits offered in the Knight No. 50!

Here is power and speed—exceptional accuracy—rugged strength and rigidity—efficiency and operating convenience—and maximum flexibility to handle an extreme range of difficult and unusual boring and vertical milling jobs, both large and small. Check the specifications and note the unusual capacity provided by the cross table travel and vertical capacity.

Whether used in tool room or production line, Knight's No. 50 promises sizable cost reductions and increased output. Get the facts . . .

Mail the Coupon Today!

SPECIFICATIONS

- Table travel—Longitudinal 28″; cross 18″
- Vertical capacity—28″
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- Table feeds—per minute, 5/16″ to 20″
- Table rapid traverse—both directions 100″
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- Boring feeds—Infinitely variable, .0000″–.010″
- Horsepower, 7½
- Weight, 8100 Lbs.

KNIGHT VERSATILE MILLERS ACCURATE-RIGID

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Please send catalog on No. 50 and other Knight Milling machines.

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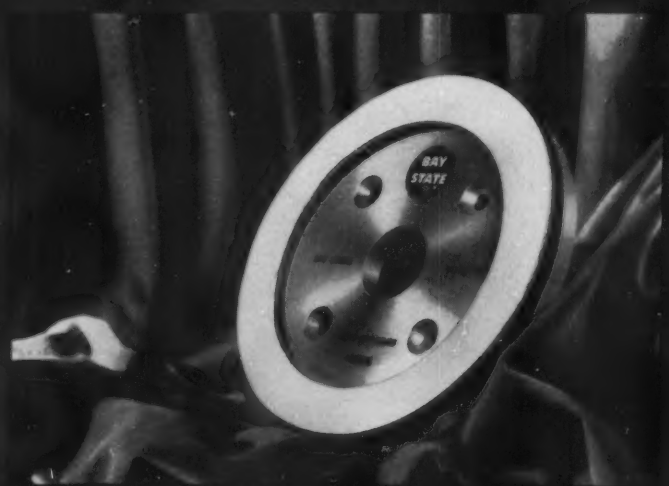
☐ Send information on Knight's 20″ and 42″ Rotary Tables.

Bay State Diamond Wheels



...for ANY "ENGAGEMENT"!

Engagements, diamonds, and life-time bonds have long been partners. So have BAY STATE, and "Grinding Wheel Progress".

The latest sparkling development is BAY STATE'S new Vitrified bond which holds *every* diamond particle until the last bit of its cutting ability is used.

Results: More uniform cutting rates, greater efficiency per unit of abrasive, still longer wheel-life, and . . . more grinding wheel progress by BAY STATE!

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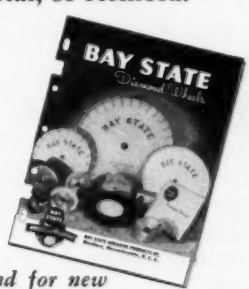

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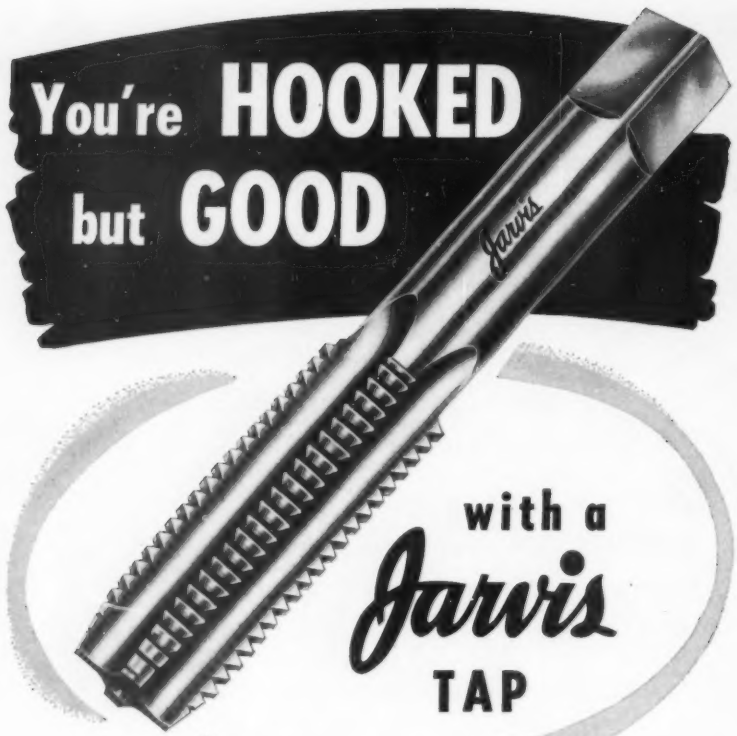

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We Mean, of course, the "custom made" controlled hook ground in the flutes of a Jarvis Tap. Our highly accurate machine fluting process, in which wheel radius, depth of grind and indexing are painstakingly controlled, is a guarantee that the amount of hook ground for your particular needs will be precisely met!

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THE CHARLES L. JARVIS CO.
MIDDLETOWN IN CONNECTICUT

in each case. If he does not, he isn't trained enough and should either be sent to some instruction course run by the company or some school in the town or community, or else Ed must make some arrangements so that he can learn what kind to use. Ed might perhaps hire somebody capable of helping him.

The first man in the office the sales engineer would contact would probably be the purchasing agent or his assistant, who may know little about grinding wheels or their use. Then the foreman might be called in, or the salesman is perhaps sent down to the shop foreman.

Any salesman has the right to try to convince anybody that his wheels are better than anybody else's, but this he must do under conditions that don't jeopardize production or disturb the man he is after. Every salesman who tries to exploit any man through gifts should be kept outside the shop. If such methods were tolerated it would certainly lower the morale of foreman and the men in the shop.

Ed is right in stating that he doesn't buy except on performance. If a salesman on such conditions invites him to a dinner or offers him a cigarette lighter he is also perfectly right in accepting such offers. I have sometimes myself been offered different little things in that line, but I have always turned down the matter if it was tied up to any conditions.

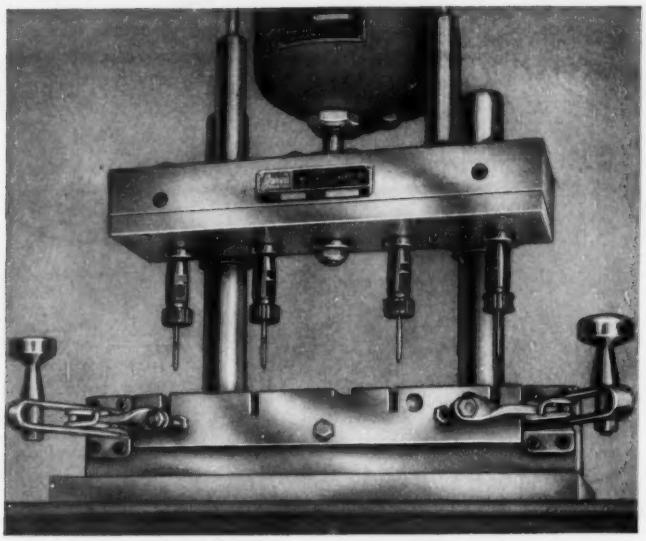
Salesmen should never have the right to go out on the production floor to demonstrate their wares except under conditions outlined above. Underhand tactics should never influence any foreman in his acceptance or rejection of any purchase suggestion made to his company. If his character is so weak that he is influenced by gifts, he should not be retained as foreman.

A E Fristedt
Stockholm-Bromma, Sweden

WHY DOES AL ALLOW the salesmen out in the shop at all? I am surprised that he condones these goings on. I should certainly tell the salesman that any business he wants to transact must come through me and to let the men alone or else.

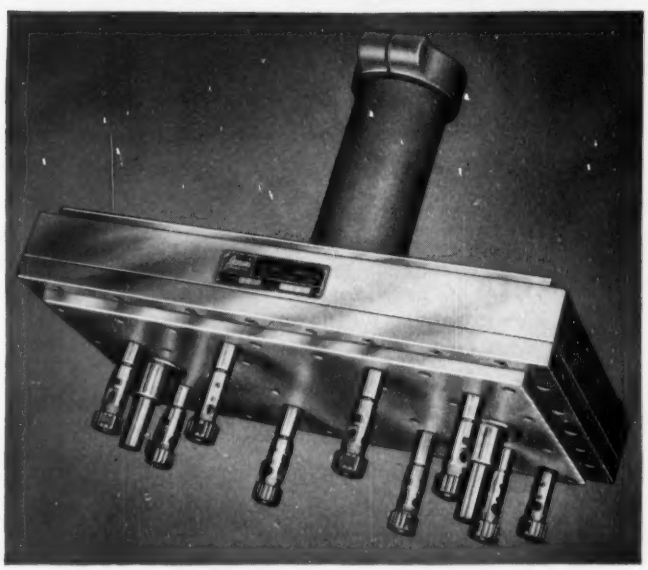
In a well-ordered plant no salesman is allowed in the shop without an invitation from the superintendent or the foreman; in most cases there is no call to bother the help. If he has anything to discuss, he should do business in the office of the foreman who should be best qualified to pass on the merits of a product, or at least he knows what

For Multiple Tapping and Drilling . . .



AN INDUSTRIAL MACHINE FOR INDUSTRIAL USERS

Jarvis MULTI-TAPPERS



Engineered and built tc your specific production requirements from our basic standard components, Jarvis Multi-Tappers can be furnished for any type of drill press available.

We invite your inquiries—let us assist in analyzing your tapping and drilling needs!

Send for our catalog featuring Jarvis Multi-tappers

NEW FEATURES OF JARVIS MULTI-TAPPERS

include:

- Aluminum case—Jig bored.
- Gear driven—positive action, silent drive.
- Ball bearings throughout.

WHEN POWERED WITH A JARVIS TORQOMATIC DRIVE THE JARVIS MULTI-TAPPER PROVIDES THE MOST EFFICIENT AND PRODUCTIVE MACHINE IN THE FIELD.

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WHAT IS YOUR

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AIRCRAFT PRODUCTION?

Does any job in the following list give you trouble? If you'll circle the corresponding number in the coupon, we'll be glad to tell how we can help you.

This list of cleaning (and related) jobs was made up with the advice of several of our customers in aircraft production. It shows, in order of volume, the jobs on which Oakite has most frequently been able to save them time and money. Here it is:

1 Cleaning aluminum, steel and magnesium
2 Stripping paint (solvent or hot tank)
3 Machining, grinding, forming
4 Deoxidizing aluminum
5 Steam cleaning aluminum and steel
6 Deflocculating paint in spray booths
7 Preparing metal for painting
8 Removing scale and corrosion
9 Preventing corrosion

FREE Our 48-page illustrated booklet "*How to Clean Metals in Aircraft Production*" contains information on all the cleaning jobs in the list.

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Send me a FREE copy of your booklet "*How to Clean Metals in Aircraft Production.*"

I especially wish to get better results in the jobs indicated by the numbers circled below:

1 2 3 4 5 6 7 8 9

NAME_____

COMPANY_____

ADDRESS_____

his problems are and he can relay them to the salesman.

In most plants the purchasing department sees all sales people and if there are any questions regarding a product the purchasing agent calls the foreman to his office to discuss the matter with the salesman. In rare cases he does send a salesman to see a foreman in the shop and if he does, he does not expect the salesman to bother the help.

Even in small plants there should be a rule against outsiders taking up the men's time and all calls should be taken up by the foreman or the head of the shop.

William C Betz
New Britain, Conn

•

HOTSHOT FATHEAD

Is there any solution to the problem of trying to maintain peace in the department if you have a first-class machinist who won't keep that fact to himself? Is it better to fire the man, or try to point out to him that his arrogance infuriates everyone else?

IS THERE A MAN WHO KNOWS more about the usual run of mechanical work than anybody else?

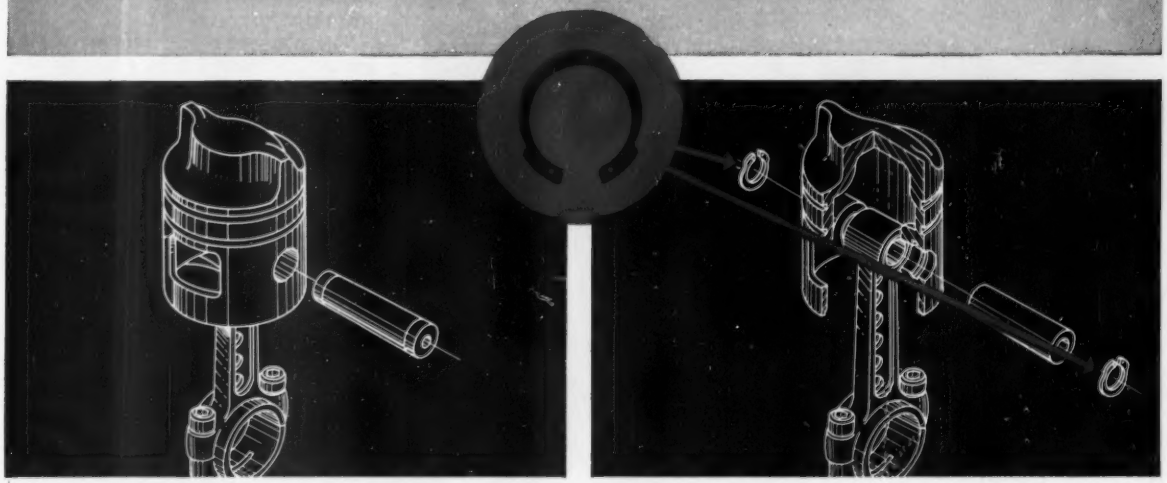
Skinner thinks he does, and is producing a large hunk of worry for Al, for Skinner is so egotistical that it looks as if this element is leaking out of him; he would tell any man to "Go jump in the lake."

Al should remember that empty barrels make the most noise, and, as for his fear that production will decrease if he fires the fathead, he should remember that Skinner stirs up lots of antagonism and disorder among the other men in his department and these small elements tend to reduce every man's efficiency; a dozen small losses amount to more than any one loss which Skinner could make.

I recall a bully, probably the same type of animal Skinner is, who caused much strife in a department of a large plant where he worked. His actions were exasperating, to say the least, for he had a large mouth which gabbled all the time. Sometimes he would walk down through the department and daub green paint or tar on the under sides of the lathe apron handles; in fact his mind was full of deviltry. The final last act was to tweek the nose of the assistant foreman. Now, a foreman should be a man who has been trained in his duties by experience, and he is usually educated in diplomacy of the down-to-earth kind.

In the case under discussion, the

2 Waldes Truarc Rings Replace 2 End Plugs ...Eliminate 3 Operations...Save $.066 Per Unit



OLD WAY Two inserted-plug type wrist pin locks hold wrist pin in place. 3 operations involved: costly machining, pressing in place, post-assembly machining. Costly maintenance problem—resulting from end plugs hammering loose.

TRUARC WAY Two Truarc Inverted Retaining Rings (Series 5008) hold wrist pin in place. Truarc Rings snap into grooves easily cut in piston, provide positive lock . . . practically eliminate maintenance costs. Quick assembly, disassembly.

Titan Chain Saws, Inc., Seattle, Washington, uses 2 Waldes Truarc Rings to replace old-style inserted-plug type wrist pin locks in their Titan chain saws. Use of Waldes Truarc Retaining Rings eliminates 2 press fit end plugs. Machining of plugs, pressing in place, finish machining—no longer required. Truarc way holds rejections to a minimum. Unit efficiency is greatly increased.

Redesign with Truarc Rings and you, too, will cut costs. Wherever you use machined shoulders, bolts, snap rings, cotter pins, there's a Waldes Truarc Retaining Ring designed to do a better job of holding parts together.

Waldes Truarc Rings are precision-engineered . . . quick and easy to assemble and disassemble. Always circular to give a never-failing grip. They can be used over and over again.

Find out what Waldes Truarc Retaining Rings can do for you. Send your blueprints to Waldes Truarc engineers for individual attention, without obligation.

USE OF 2 WALDES TRUARC RINGS PERMITTED THESE SAVINGS PER UNIT:

OLD WAY	
Cost of 2 end plugs Cost of pressing in and machining	$ .169
TRUARC WAY	
Cost of grooving piston Cost of 2 Truarc Rings	.103
Saving per Unit	**$ .066**

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WALDES TRUARC RETAINING RINGS AND PLIERS ARE PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: 2,382,947; 2,382,948; 2,416,652; 2,420,921; 2,428,341; 2,439,785; 2,441,946; 2,455,185; 2,483,380; 2,483,383; 2,487,802; 2,487,803; 2,491,306; 2,509,081 AND OTHER PATENTS PENDING.

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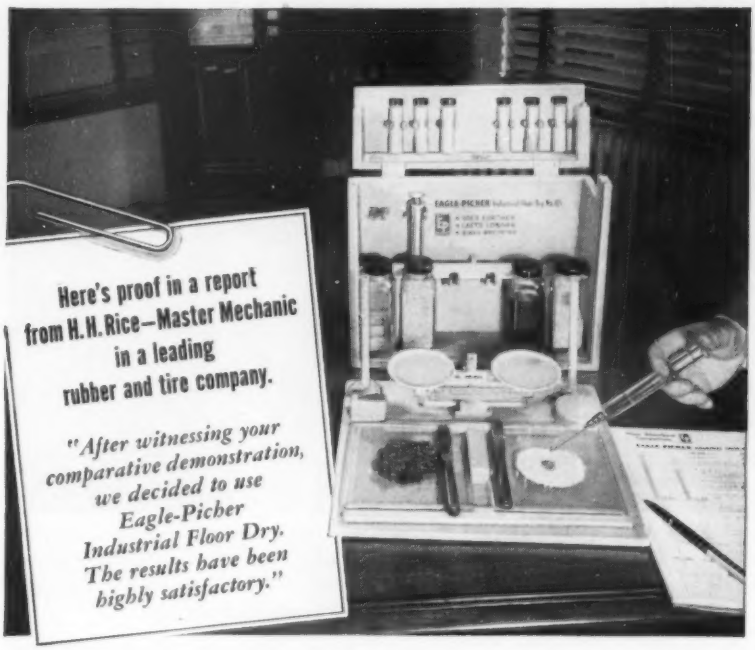
There's a big difference *in floor absorbents*


Here's proof in a report from H. H. Rice—Master Mechanic in a leading rubber and tire company.
"After witnessing your comparative demonstration, we decided to use Eagle-Picher Industrial Floor Dry. The results have been highly satisfactory."

You, too, can witness the difference in floor absorbents! With his portable laboratory, your Eagle-Picher man will analyze your floor absorbent *right in your office.* You may actually conduct the test yourself! Without obligation, of course.

Here's what the test shows—

- The amount of oil and water absorbed for given bulk.
- The cost of your absorbent in terms of absorption and coverage.
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You'll see that Eagle-Picher Floor-Dry is insoluble, chemically inert and non-combustible . . . that it combines light weight for exceptional coverage with light color for brighter, safer working areas. Write today for the full story.

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EAGLE EP PICHER Since 1843

THE EAGLE-PICHER COMPANY
General offices: Cincinnati (1), Ohio

foreman took the bully aside and had a discussion with him about his deportment while in the shop. He informed him, emphatically, that it was necessary for him to mend his ways or there would be trouble. From the conversation between the two, it was evident that there was a war going on. The bully took a poke at the foreman but the latter was ready and he knocked the fellow down on the shop floor.

The next morning, the bully appeared and asked if he could be allowed to go to work, and he did.

During the morning, the foreman went over to him and had a quiet discussion ending up with "Ben, you are a damn good mechanic, but don't forget that there are as good fish in the sea as were ever caught."

Never were truer words spoken; Al should never knuckle under to any man in his department. No man is irreplaceable and if one knocks out, another will take his place in the general run of the world.

F H Stebbins
Worcester, NY

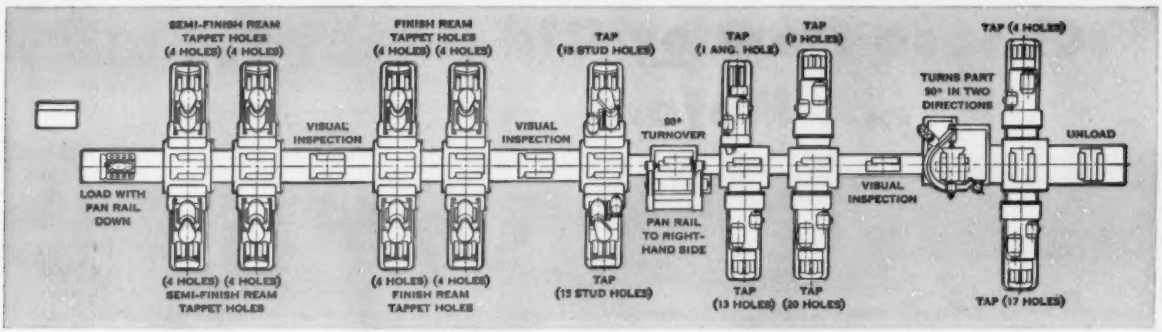
•

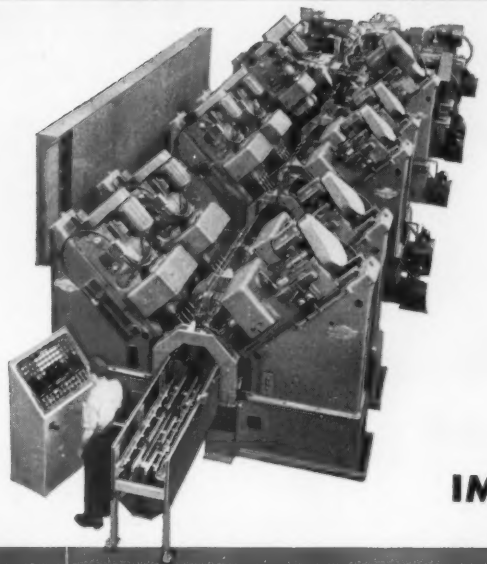
SHOPKEEPER

Who should sell hand tools and gages to the shop mechanics? Can one man be allowed to handle it on his own, or does this amount to an unfair monopoly? Is there one best way to handle tool sales, or does each case depend strictly on what kind of a shop it is?

IT ISN'T ALWAYS convenient for a man to make tool purchases. Especially is this so in a large city where the source of supply is very remote from the shop where one works. I recall vividly a case where I had broken a tool that was very vital at the time, and I did not delight in the thought of borrowing one from a fellow worker. I had to travel on a streetcar for a half hour in order to reach the place where I could buy the tool. Now, had the shop some way in which I could have gotten this tool without losing a couple of hours from my work, I would have been money in pocket and believe me, money in the pocket those days meant money.

I don't like the idea of selling tools from the toolcrib, nor do I favor having one man be given permission to sell tools. The crib serves as a definite function of the shop—to provide tools as they are needed, and to check them in after they have been used. Checking in tools requires careful inspection, and if any excessive wear or damage shows up, effective remedies must be instituted to bring them into perfect condition. The


SEMI-FINISH REAM TAPPET HOLES (4 HOLES) (4 HOLES)
FINISH REAM TAPPET HOLES (4 HOLES) (4 HOLES)
TAP (15 STUD HOLES)
TAP (1 ANG. HOLE)
TAP (9 HOLES)
TAP (4 HOLES)
TURNS PART 90° IN TWO DIRECTIONS
UNLOAD
VISUAL INSPECTION
VISUAL INSPECTION
90° TURNOVER
VISUAL INSPECTION
LOAD WITH PAN RAIL DOWN
PAN RAIL TO RIGHT-HAND SIDE
(4 HOLES) (4 HOLES) SEMI-FINISH REAM TAPPET HOLES
(4 HOLES) (4 HOLES) FINISH REAM TAPPET HOLES
TAP (15 STUD HOLES)
TAP (13 HOLES)
TAP (20 HOLES)
TAP (17 HOLES)



SOME NEW IDEAS FOR MACHINING AUTOMOBILE V-8 CYLINDER BLOCKS

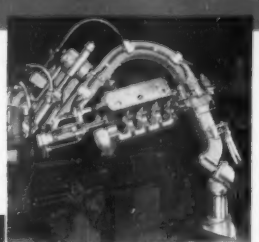
On this new automatic transfer machine — one of the latest in the long series pioneered by Greenlee — automatic handling and repositioning of the block provides some new accomplishments. Two repositioning stations permit the units of the machine to work on the block from *six* different directions. Instead of being slid along the rails, the work is *lifted and carried* between positive locating fixtures at each position.

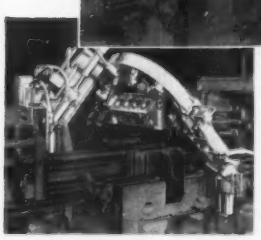
UNIQUE ELEMENTS IMPROVE PERFORMANCE OF

GREENLEE

TRANSFER MACHINE

The unusual repositioning unit shown at the left, plus a number of other distinctive Greenlee features, enable the user of this machine to achieve new high standards of quality and production.





Above, two views of the "half-twist" repositioning unit which relocates the block 90° *in two directions simultaneously*, rolling it half over and also turning it from endways to crossways of the machine.

Left, the "front" end of the machine where the partly-finished block is easily rolled into proper position for the transfer bar to lift and carry it automatically into the first machining unit, where it is positively located and clamped for the tool-feed cycle.

PRODUCTION MACHINERY
GREENLEE

GREENLEE BROS. & CO.
1723 MASON AVENUE
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MULTIPLE-SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES

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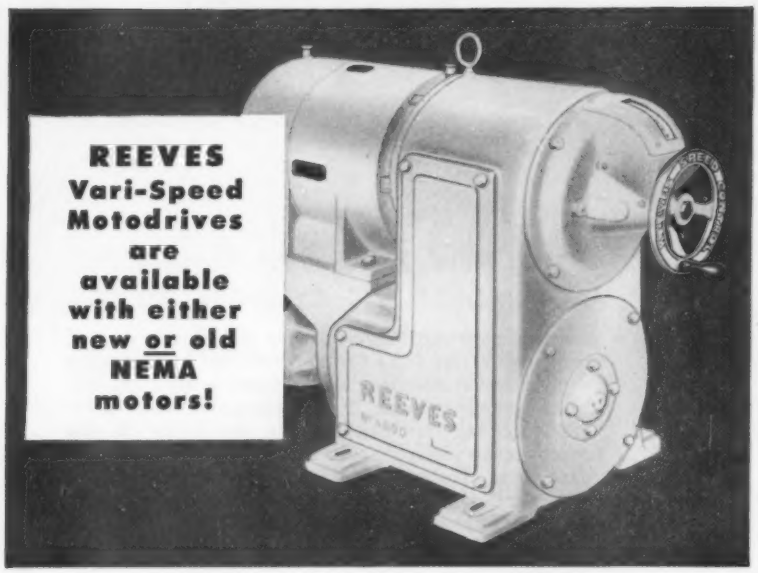

. . . but always choose

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With each new development and improvement in industrial progress—such as the new, smaller size NEMA Motors—you can always look to REEVES to be in step with the latest, most modern developments in speed control. You don't have to wait for new designs or adaptations. In keeping with their fine pioneer tradition, REEVES offers you *now* all the advantages of *smaller* Motodrives in practically every case when you order 1 hp or 2 hp drives with the new NEMA Motors. Write today for complete details to Dept. A5a-G.

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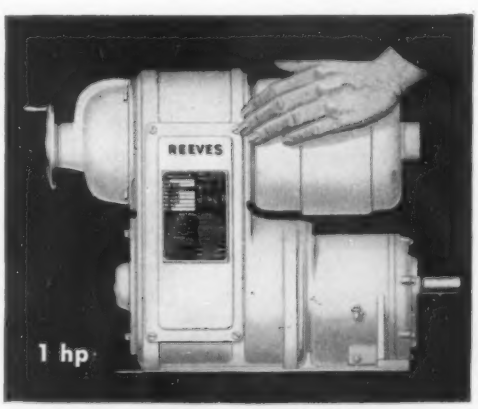

REEVES PULLEY COMPANY • COLUMBUS, INDIANA

toolcrib attendant has all he can do in order to keep his stock in first-class shape. He's not going to be able to concentrate on the work at hand if he is called upon to sell stuff over the counter.

The selling of tools by an individual will not take up so much of his time, but it has always struck me as fishy business—especially when one individual has been given the exclusive. If a man can sell tools to the workers, why can't any of the other men have the chance of earning a few extra dollars by doing likewise? Let the fellow do the work he was hired to do or the first thing you know he will be pushing a Good Humor cart around among the machines.

I cannot understand why the purchasing department is not made available for the workers to buy through the P A, who could secure the same liberal discount as he gets for the firm. Surely the employer has the interest of his workers sufficiently at heart to put up with the little expense of conducting the purchases. It certainly seems right that any piece of equipment that is going to enable the worker to perform his business comes under the heading of company business.

Jeff Gleason
Glendale, Calif

ALTHOUGH IT IS IMPOSSIBLE for any machinist to have all tools to meet demands at a new place, and although very few machinists have a complete tool kit at their disposal, I think it is wrong to give such privileges as Ed has granted Jones. Very likely every new man would need some new tool when he starts, and this is a task too big for any employee to handle.

To me it looks as if Ed thought Jones could take an order for a single tool, run to the supply house and get it, turn it over to whoever ordered it, and collect a profit. This is not the case at all. No supply house can run a business that way. Only if Jones could buy in quantities would it be possible, through the trouble saved, to grant him a commission.

I cannot agree with Ed, either, that it wouldn't cramp Jones too much because he is a repairman. This is a funny way of reasoning. I hold that Jones's time is just as valuable being a repairman as if he held any other job, and that time should be used to the benefit of his company from whom he receives his pay. Claiming that new men waste some time anyway is no reason for increasing this waste, and whose fault is it that new men lose time? Ed's, of course. If a man is hired, it is the foreman's duty to be prepared for it, and have a job

IN A HOLE?

Here's a tough threading job that could be done only with an "Acorn" Die easily. The compact holder and protruding die lands permit entering the counter bored hole and cutting threads right down to the bottom.

Only a holder body, a cap and a one piece die! Put them together and you have a high speed production tool that is really rugged, accurate and dependable.

Cutting sizes #0-80 to 1½"-12." Holders for many types of machines.

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Taking the wheel of Hudson Motor Car Co.'s "Italia," N. K. VanDerzee, V.P. in Charge of Sales, explains:

How a new Hudson avoids traffic problems!

"Here is the new *Italia*—a look into the future and the latest member of the Hudson family which includes the Hornet, the Wasp, and the Jet," says N. K. VanDerzee.

"But new design naturally creates new traffic problems—in the factory. It's a big job to prevent parts shortages from stalling assembly lines. Air Express is a tremendous help.

"As our Traffic Department puts it: One phone call, and it's a load off our minds. Air Express delivers in a matter of hours. This dependable speed gives us the safety margin we need to keep production rolling. We handle about 2,500 lbs. a month by Air Express. Naturally, we're thinking about speed. But our records show that most of our Air Express shipments also *cost less* than they would by any other air service!

"Add to this the country-wide coverage and Air Express' ability to pinpoint shipments in transit, and you have some idea of why our Traffic Department turns to Air Express for our most urgent traffic.

"We in Sales are proud of our reputation for on-time deliveries of new cars. In large part, we owe that reputation to our Traffic Department—and Air Express."

It pays to express yourself clearly. Say Air Express! Division of Railway Express Agency.

Air Express

GETS THERE FIRST via U.S. Scheduled Airlines

and, eventually, tools ready for him when he reports for work. If a foreman suspects a man doesn't have enough tools, he ought to find that out when he is hired.

To send each man to Parker & Perkins supply house to get needed tools is still worse. The company's bus and the men's time, I think, can be used more profitably than to buy tools. And if the distance to the supply house is great, the arrangement wouldn't only be extensive—it would be foolish. And some guys would probably not come back at all for work.

If a man suddenly needs a tool, which he hasn't got, or lacks money to buy, his foreman can probably borrow it from some fellow in the shop, and tell him to get it when he has money enough. I have worked as a machinist many years, but very few times have I been cornered for lack of tools. These few times I have always been able to borrow them from some fellow worker.

I agree with Al that if tools should be supplied in the shop, it should be handled by the toolcrib, not as a private enterprise, but as an activity of the company. Then all tools could be bought at lower prices, which would favor both the company and the men buying them. Very likely many tools could then be ordered directly from the manufacturer, which would make them still cheaper. This would be far more rational than turning such duties over to one of the men in the shop.

I'm surprised that Ed considers his toolcrib men's time as wasted if they handle the sale of tools, whereas the repairman's time did not matter. At least sometimes the repairman's time is more valuable than even the best toolmaker's. This depends, of course, on the repairman's duties from time

"Look Singley, I don't mind you selling your eggs in the shop, but —"

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CHICAGO U. S. A.
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Precision that lasts

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"Stamina" Features:

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TAPER ROLLER BEARINGS

No lathe can be more accurate than its spindle bearings. Hence before buying any lathe one should check the **exact** type and tolerances of bearings used!

All SHELDON Precision Lathes have "Zero Precision" Taper Roller Bearings, held to tolerances of .00015"—more accurate than the bearings found in most lathes. They are also the sturdy type that hold their accuracy thru long hard use . . . hold it even under abuse. With the other stamina features built into SHELDON Precision Lathes, they assure continued accuracy, without costly maintenance, thru years of hard service.

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Simple and complex bends are readily formed and duplicated in many ductile materials with hydraulically operated Di-Acro Benders. The Bender can be delivered completely tooled for bending moulding, extrusions and other solid materials. Tooling can be made in your own plant if you prefer.

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311 8th Ave.
LAKE CITY, MINN.

di-acro PRECISION METALWORKING MACHINES

to time, as well as his abilities there.

The selling of tools by a selected man in any shop is a very inefficient method, so I suggest that this problem be solved as outlined above. It is an advantage in all shops to help their guys get tools and other commodities at cut prices.

Every man will be more loyal toward his employer if he discovers that the company helps him get the things he needs cheaper than he could in the open market.

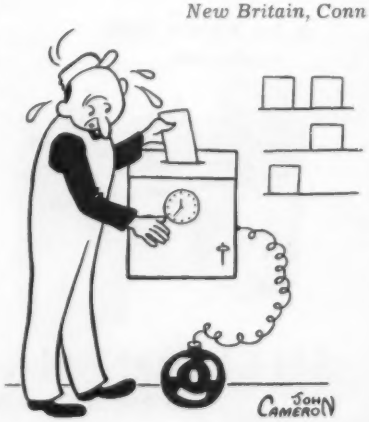
A E Fristedt
Stockholm-Bromma, Sweden

THE IDEA OF ED'S allowing one of his men to sell tools on company time does not look like a good one. If one man can sell tools, there are others who will also look for the privilege, or there will be a howl of favoritism on the part of the foreman.

In a plant where the writer was once employed, tools could be purchased through the foreman who carried certain items in stock to supply apprentices from time to time who were entitled to receive them to a certain dollar amount. The journeymen could also buy tools through the foreman, paying for them with cash, or they could pay through payroll deductions on terms to suit. Any discounts the company could get were passed on to the men. Up-to-date catalogs were kept in the office so that the men could choose tools from many makers.

In another plant I know of, tools may be secured through the purchasing department direct. The employee makes out an order on a small pad, stating his name, clock number, date, and the maker's name and the number of the tool in the catalog; he also states how he wants to pay, either cash, or a certain amount of payroll deduction. These orders are executed promptly so that the employee has a minimum delay in receiving his merchandise.

Wm C Betz
New Britain, Conn



Save Production Tooling Costs

WITH

SPEED VISE

A HUNDRED JIGS IN ONE

Drill jigs and other fixtures are simpler, cheaper, smaller when made for use in a SPEED VISE. Instead of a cumbersome and expensive box jig, with a SPEED VISE it is only necessary to make a simple jaw plate to fit the part being machined and hold drill bushings, etc.

QUICK ACTION DESIGN The fastest acting vise you've ever seen. One hand operation—lift . . . slide . . . lock . . . that's all there is to it.

STANDARDIZED HOLES for attaching jigs or jaw plates are provided in the jaws of all SPEED VISES.

HARDENED STEEL is used on the screw and locking nut to provide minimum wear and extra long life.

HEAVY SEMI-STEEL CASTINGS for extra strength and a heavy base plate for rigidity are part of the SPEED VISE construction.

PATENTED THREAD FORM of the screw and nut is a steep undercut. Screw is held positively in the nut when the vise is clamped.

Write for Bulletin No. 24-AM

CARDINAL MACHINE COMPANY

1819 Dana Street
Glendale, California

How Correct Lubrication cured them— and saved 37 production hours per week!

SOCONY-VACUUM

Correct Lubrication

FIRST STEP IN CUTTING COSTS

You could almost set your watch by it. At first, everything was normal. Then—slowly, mysteriously—it happened...the "jaws" gradually stiffened, moved more and more erratically, finally froze rigid. "Lockjaw" had set in again!

It was happening in a large auto plant. Twice a day five big lathes were shut down for 45 minutes while the chucks—or "jaws"—were cleaned and repacked with fresh grease so that production could continue on crank shaft forgings. All remedies had failed.

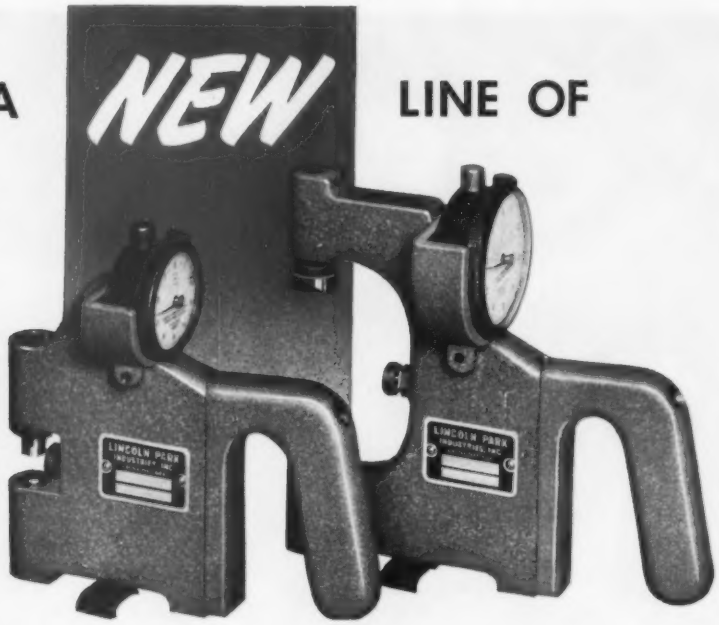
A Socony-Vacuum man discovered this situation while making an analysis of the plant. Shocked by this huge waste of time and production, he asked one of his staff engineers to investigate.

This engineer studied the problem, made lab tests, found that cutting coolant, continuously splashing over the chucks, caused the grease to harden. He recommended a special Gargoyle grease—Sovarex #1. It cured the "lockjaw."

This is an actual case. It points up how much you may gain by using *Correct Lubrication*—top-quality products *plus* the world's greatest lubrication knowledge and engineering service. Can you afford to accept anything less?

SOCONY-VACUUM OIL COMPANY, INC., and Affiliates: MAGNOLIA PETROLEUM COMPANY, GENERAL PETROLEUM CORPORATION

A NEW LINE OF



DIAL SNAP GAGES

Again, Lincoln Park Industries steps forward with a new development in snap gages that means further help to your production. Note these real advantages:

SIMPLIFIED DESIGN AND CONSTRUCTION —Lincoln Park Dial Snap Gages are designed to give a direct reading from the measuring anvil to indicator. There are no bearings, levers or cams to get out of adjustment.

PRECISION ADJUSTMENTS — By means of its fine pitch ground thread screw attachment, the upper anvil can be adjusted within a ¼" range.

WEAR-RESISTANT ANVILS —The parallel anvils are supplied either carbide tipped or Carb-O-Plated.

SHOCKPROOF —Even when Lincoln Park Dial Snap Gages are used by inexperienced operators, there is no possibility of damage by accidental shock. The indicators themselves are encased in a housing to protect them from damage.

CHOICE OF INDICATORS —Any A.G.D. size indicator can be used.

LONG LIFE —Because these gages have a minimum of parts to wear or be replaced, maintenance is negligible and long, trouble-free operation is assured.

Send for our new Bulletin giving sizes and other information.

THE PLUS IN PRECISION

Lincoln Park INDUSTRIES, INC.

1719 FERRIS AVENUE, LINCOLN PARK 25, MICH.

DESIGNERS AND MANUFACTURERS OF: SPECIAL AND STANDARD CARBIDE CHROME PLATED AND STEEL GAGES CARBIDE ROTARY FILES • ALSO FACILITIES AND SKILLED PERSONNEL AVAILABLE FOR PRECISION PARTS PRODUCTION.

NAMES in the NEWS

John Gilchrist is serving as managing director of Ex-Cell-O Corp of Canada, Ltd, a subsidiary of the Detroit corporation. Under Mr Gilchrist's direction the London, Ont, plant has built up stocks of standard drill jig bushings sufficient to answer normal needs of Canadian customers. Mr Gilchrist formerly served as president of a power tool manufacturing concern.

Howard W Hudson has been made vice president of Panalarm Products, Chicago, manufacturers of industrial annunciator systems. In his new post he will be in charge of engineering and production activities. Prior to joining the organization on a full-time basis in 1952, Mr. Hudson served in the capacity of management consultant.

Robert Von Rotz has been named chief engineer of Tuthill Pump Co, Chicago. Prior to joining the firm, Mr Von Rotz served as chief engineer with Applied Research & Development Corp of New York and Berne, Switzerland.

Howard R Richards has been elected president and general manager of Industrial Ovens, Cleveland, in line with reorganization plans undertaken a year ago. **Sloane E Allen** has been appointed vice president and treasurer; **Louis A Litzler,** secretary; **E W Baumgardner,** sales manager; and **A V Alexeff,** chief engineer. Mr Richards joined the firm in 1952 as vice president and general manager.

Richard P Connette has been named to the post of assistant vice president, American Car & Foundry Co. A member of the firm since 1945, he has been serving as assistant to the president since May 1949.

Richard H Ewert has been appointed general sales manager of Illinois Gear & Machine Co, Chicago.

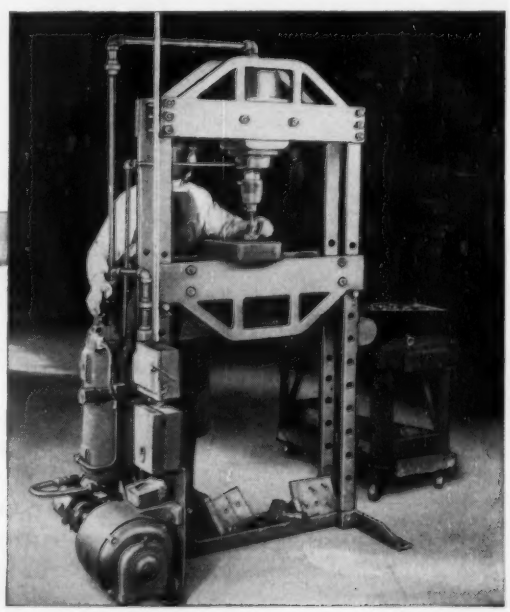
George W Steinmetz has been appointed sales manager, Chuck Div, Supreme Products, Chicago. Prior to joining the company, Mr. Steinmetz was associated with Standard Tool, Cleveland, as assistant sales mgr.

James M Cox Co, 403 East Franklin St, Richmond, Va, has been appointed representative for the NesTier small parts materials handling equipment in the state of Virginia for **Charles William Doepke Mfg Co,** Rossmoyne, Ohio.

CLAMP MAKER PUTS THE SQUEEZE ON PRODUCTION BOTTLENECKS!

BATAVIA CLAMP CO., makers of eccentric and C-clamps, bought a 50 ton motor driven KRW Hydraulic Press to do one job — set rivets in the heads of eccentric clamps. Then, like hundreds of manufacturers, they found they had gotten much more than they bargained for. They had been having trouble with loosening of T-handles on their C-clamps. Their new KRW Press offered this solution: Drill the pin hole 1/64" undersize and drive the pin in place with the Press. It worked like a charm. Straightening C-clamps that bent as they cooled, resizing distorted plungers and straightening distorted cams and feet on eccentric clamps — these are just a few of the production bottlenecks remedied by their KRW Hydraulic Press.

YOU'D be surprised how many ways a KRW Hydraulic Press can save you money on your operations. Available in 25 to 150 ton capacities, one, two or three cylinder models, KRW Hydraulics are the most versatile presses on the market. Easily converted in minutes from one set-up to another. Self-contained above ground, they come in motor, air or hand operated types. Check with your machinery dealer or get in touch with us in Buffalo.



K · R · WILSON

210 MAIN STREET BUFFALO 3, N.Y.

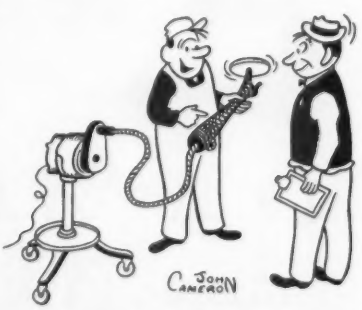
Accuracy ±.000008"
$291.50
84 BLOCK SET
For years Webber has dedicated itself to the production of gage blocks at a price that even the smallest shop can afford.
Quality and precision have not been compromised in this undertaking. Ask those who use them. Write for literature.
H. D. BLOCKS and FIXTURES
STANDARD STEEL BLOCKS
CROBLOX CARBIDE
ANGLE BLOCKS
Webber
GAGE COMPANY
12901 TRISKETT ROAD
CLEVELAND 11, OHIO
LARGEST EXCLUSIVE MANUFACTURER OF PRECISION GAGE BLOCKS

Col Harold C Parsons has assumed command of the Detroit Arsenal, replacing **Col Benjamin Whitehouse,** assigned duty in the office of the Chief of Ordnance at Washington. Prior to his assignment to the Detroit Arsenal in 1952, Col Parsons served as an Army member of the Joint Munitions Allocation Committee for the Joint Chiefs of Staff; for the past year he has directed engineering activities at the Arsenal.

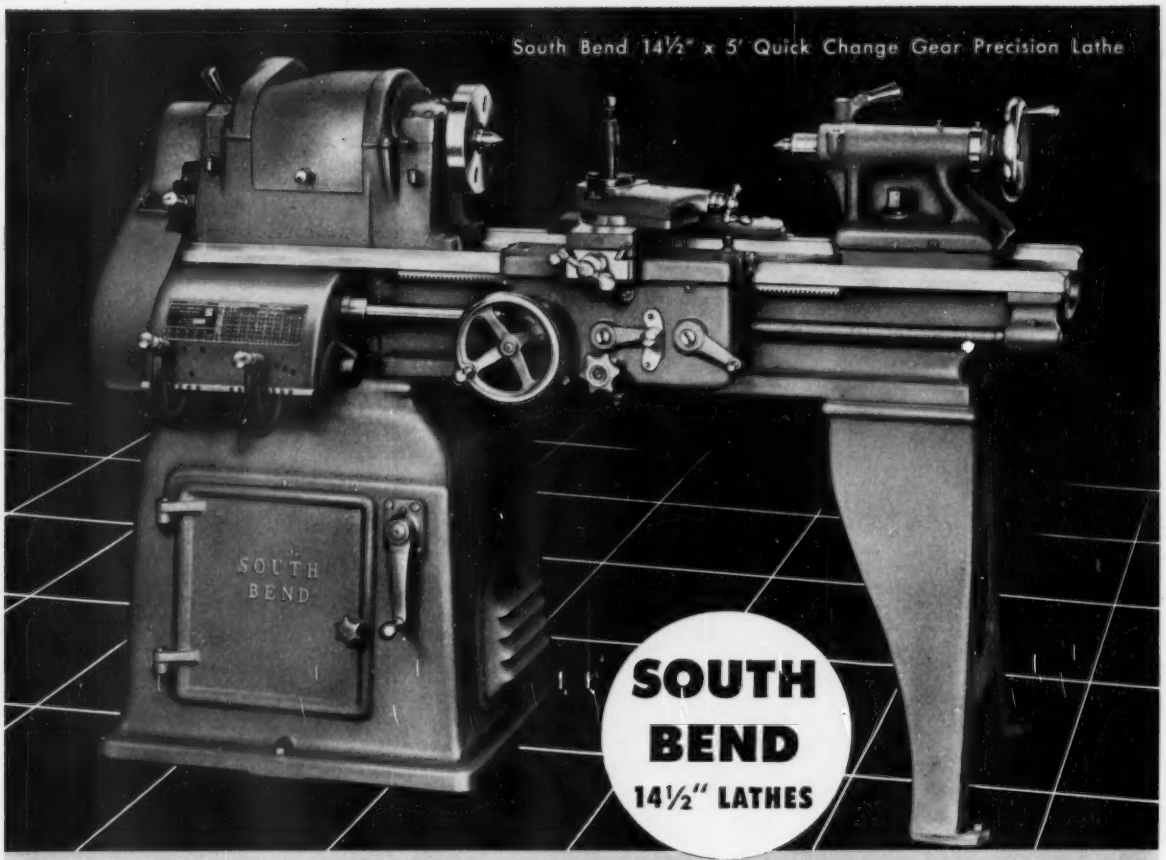
Weaver E Falberg has been appointed assistant general manager of sales of the nation-wide group of sixteen steel service plants of Joseph T Ryerson & Son, Chicago. He was formerly manager of the alloy steel division. **Roland W Burt** has been named manager of the Chicago plant, a newly-created position. **Alfred J Olson,** formerly assistant sales manager, moves into Mr Burt's post as sales manager.

Robert H Groman, divisional sales manager for Eutectic Welding Alloys Corp, New York, has been promoted to the post of director of applied welding engineering, succeeding **Helmut Thielsch.** Mr Groman joined the firm nine years ago as field engineer, became district manager, and was then appointed to the post he held at the time of his present promotion.

S N Bean, chief tool engineer of Lockheed Aircraft Corp's California division, has been promoted to the post of chief manufacturing engineer for the Georgia division. He succeeds **R R Kearton,** named assistant manufacturing manager. **J A Thomson,** sales administration manager, has been appointed director of parts and services at California; he replaces **C F Nielsen,** named director of military relations. **W A Pulver,** who has been works manager at Lockheed Factory C, has been appointed chief tool engineer; **H D duChemin,** fighter assembly division superintendent, succeeds Mr Pulver.



"With this attachment I get more play out of the flexible shaft!"



FOR FAST, PRECISION MACHINING

SPECIFICATIONS

SWINGS: 14⅜" over bed and saddle wings; 10¼" over saddle with chip guard removed.

BED LENGTHS: 5, 6, 7 and 8 feet.

DISTANCES BETWEEN CENTERS: 24½ to 60½ inches.

MAXIMUM COLLET CAPACITY: 1 inch. (Collets interchangeable with South Bend 10"-1" Collet, 13", 16" and 16-24" Lathes.)

SPINDLE BORE: 1⅜ inches.

SPINDLE SPEEDS: Eight . . . 27 to 800 r.p.m.

POWER LONGITUDINAL FEEDS: 48 R.H. or L.H., .0015" to .0841".

POWER CROSS FEEDS: 48, .0006" to .0312".

THREAD CUTTING: 48 R.H. or L.H. pitches, 4 to 224 per inch.

CROSS SLIDE TRAVEL: 10 inches.

TAILSTOCK SET-OVER: 1-5/16 inches.

CL185B, illustrated above, less electrical equipment **$1809.00**

Time payment terms: 10% down, the balance in 12 or 18 months. f.o.b. factory.

South Bend 14-1/2" Lathes offer many advantages for precision machining. Ease of operation, speed, power, accuracy, and efficiency are some of the features responsible for their popularity. Often the precision and quality of finish obtained with South Bend Lathes are such that subsequent grinding, honing, or lapping operations are unnecessary. Substantial savings in capital investment, power consumption, floor space, and labor costs have resulted from their installation.

Can I get it? When? How?

Yes—you can get most any South Bend product immediately from our distributor's stocks in principal cities. Items not stocked, shipped promptly from factory.

Three ways to order:

1. See or telephone nearest distributor.
2. Order by mail from your distributor.
3. If no distributor is nearby, order direct from factory.

South Bend machine tools with accessories may be purchased on convenient terms up to 18 months.

PLEASE SEND INFORMATION CHECKED:

☐ 9" and 10" BENCH LATHES

☐ 10" to 16-24" FLOOR LATHES

☐ DRILL PRESSES

☐ ½" & 1" Collet TURRET LATHES

☐ TOOL GRINDERS

☐ 7" BENCH SHAPERS

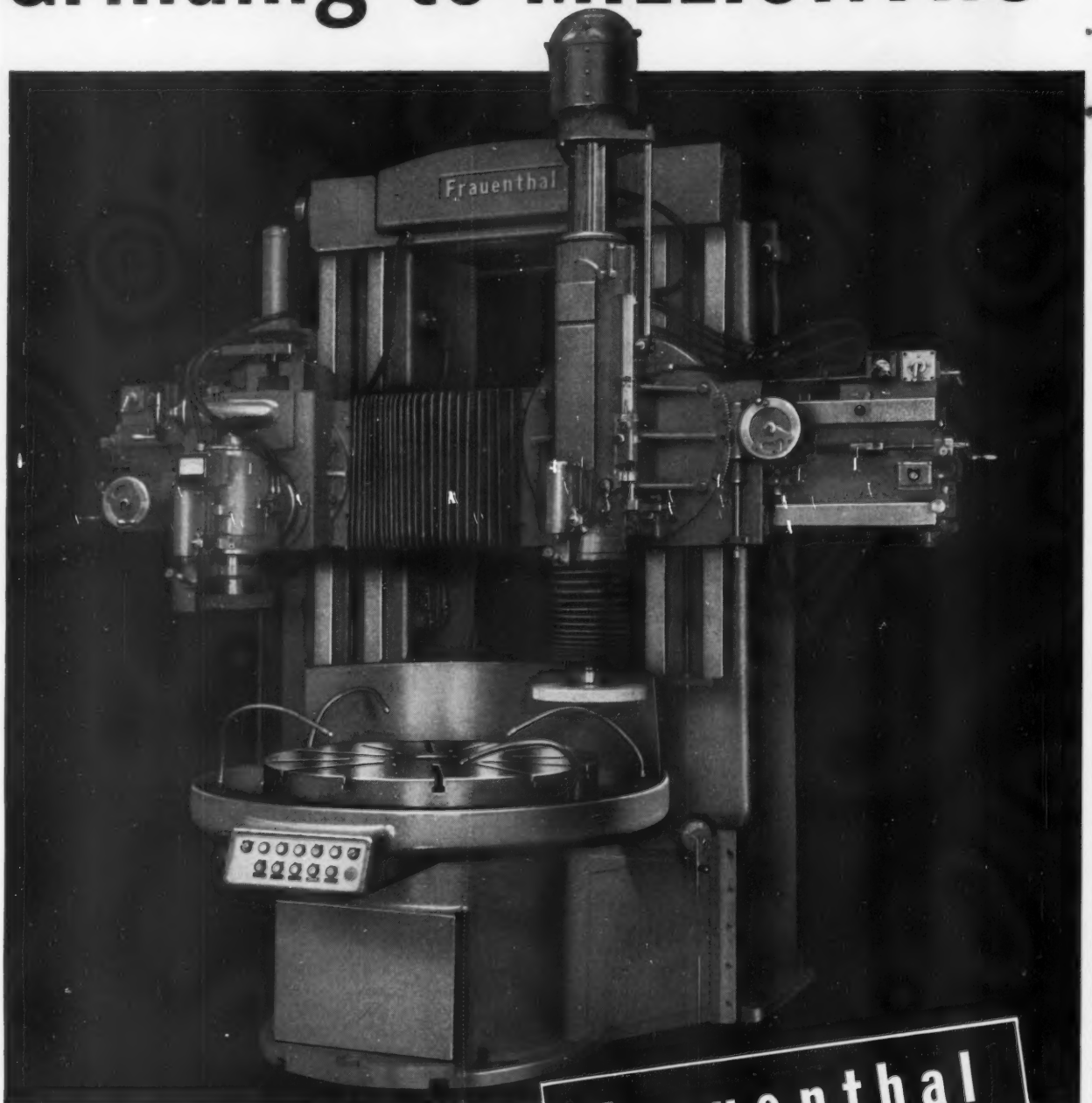
Name _____ Company _____

Street _____ City & State _____

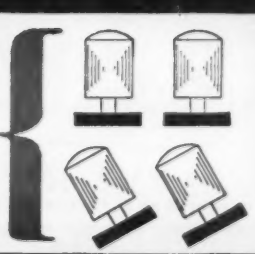
SOUTH BEND

Building Better Tools Since 1906 • **SOUTH BEND LATHE** • South Bend 22, Indiana

Grinding to MILLIONTHS



Many combinations of spindle positions for simultaneous grinding on all sizes of Frauenthal Grinders



Frauenthal

MULTIPLE-HEAD SUPER-PRECISION VERTICAL **Grinders**

PRECISION-GRIND INSIDE, OUTSIDE AND FACES SIMULTANEOUSLY TO MILLIONTHS OF AN INCH!

# of an inch precision with Frauenthal Grinders

IMPOSSIBLE!... **said one machine tool man**

UNBELIEVABLE!... **said another, skeptically**

SHOW ME!... **said a progressive executive**

THIS **is what we have shown many:** You can get such super-precision grinding with these unique grinders that *the normal method of expressing tolerances in tenths-of-thousandths of an inch became inadequate* when precision was attained to *fractions of tenths-of-thousandths, expressed best in MILLIONTHS of an inch.*

AND *THIS* IS PERFORMANCE-PROOF... details on request

PRECISION GAUGE READINGS • CHART NO. 1

MAX. VAR. IN FACE THICKNESS (Parallelism)				MAX. VAR. IN WALL THICKNESS (Eccentricity)			
Station	Reading	Station	Reading	Station	Reading	Station	Reading
1	.000000"	7	.000000"	1	.000000"	7	+.000020"
2	+.000010"	8	+.000020"	2	+.000010"	8	+000010"
3	+.000030"	9	+.000030"	3	+.000020"	9	.000000"
4	+.000030"	10	+.000030"	4	+.000020"	10	−.000010"
5	+.000030"	11	+.000030"	5	+.000010"	11	−.000020"
6	+.000010"	12	+.000020"	6	+000020"	12	−.000010"

Maximum Variation in Parallelism: .000030" Maximum Variation in Eccentricity: .000040"

PRECISION GAUGE READINGS • CHART NO. 2

MAX. OUT-OF-ROUND ON O. D.				MAX. OUT-OF-ROUND ON I. D.			
Station	Reading	Station	Reading	Station	Reading	Station	Reading
1	.000000"	4	−.000050"	7	.000000"	10	−.000110"
2	−.000020"	5	−.000080"	8	.000000"	11	−.000070"
3	−.000040"	6	.000000"	9	−.000050"	12	.000000"

Maximum Variation, Outside Diam: .000080" Maximum Variation, Inside Diam: .000110"

What is YOUR grinding problem?

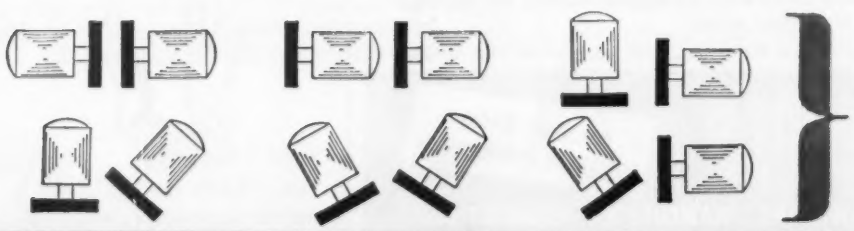
We'll be glad to work with you on difficult grinding, boring, turning problems. A wide variety of combination grinding of outside and inside diameters or faces can be made SIMULTANEOUSLY to assure utmost precision and unfailing interchangeability of parts. Adaptations for specific jobs also can be engineered into these grinders for high production at low cost.

TEN STANDARD SIZES conforming to essential J.I.C. specifications

SERIES	TABLE SIZES	MAXIMUM SWING
1800	30"	60"
	36"	60"
	42"	60"
	48"	60"
2000	60"	72"
	72"	88"
2200	110"	120"
	120"	130"
	130"	140"
	140"	150"

Frauenthal Division

THE KAYDON ENGINEERING CORP. • MUSKEGON, MICHIGAN



WRITE for Bulletin

NELCO CARBIDE TIPPED SLAB MILLS—

SET NEW PRODUCTION *Records!*

Machine Army Automatic Rifle Receivers in 1/3th the time . . . to better finishes . . . with 30 times more pieces per grind than conventional cutters!

An amazing story, but TRUE! Working on tough, scaly Perlitic Malleable iron castings, Nelco carbide tipped slab mills took a healthy .100 - .125 bite—a full 3½ inches wide—on a 3 horsepower machine at the incredible feed of 11½ inches per minute! Not only did the Nelco slab mills surpass conventional cutters in speed, *but produced better finishes, 400% more production per machine!*

HERE ARE ACTUAL PRODUCTION FACTS

	High Speed Steel slab mill 80 RPM	Nelco carbide tipped slab mill 410 RPM
Feed (in/min)	1¾	11½
Production per machine	6 pcs. per hour	29 pcs. per hour
No. of pieces per grind	8	250 (average)
Finish	Wavy—needed extensive polishing	Superior machine finish—only minor polishing needed

Production test this amazing slab mill in your shop—Investigate NELCO today! This example is typical of the time-saving, money-saving benefits users report when using Nelco carbide tools. With nearly 800 tools regularly stocked, you can order —and GET—"special" tools at standard prices.

For full information on the *complete* Nelco line, send today for 48 page catalog.

NELCO TOOLS

For that Extra EDGE in Production

NELCO TOOL COMPANY, INC., MANCHESTER, CONNECTICUT

Sam Morrison, president of Morrison Steel Products, Buffalo, has been elected second vice president of the Pressed Metal Institute. Mr Morrison has been active in PMI affairs for the past ten years, having served as Western New York district chairman, a member of the board of directors, and executive committee.

Raymond L McFarland, formerly chief of the industrial service branch in the Toledo, Ohio, Regional Army Ordnance Office, has been named plant manager of Firth Machine & Tool's plant at Fostoria, Ohio.

W J Ulrich, senior sales representative in the Detroit area for the Carborundum Co, has been elected vice president of the organization. He will continue his sales activities in the Detroit area. **F W Bonacker** has been named assistant vice president in charge of sales for Carborundum's Bonded Products & Grain Div. Other appointments to Niagara Falls posts in the division were: **W J Kingsley,** sales manager for industrial product lines; and **J G Fritzinger,** sales manager for special accounts. Appointments to headquarters posts of the Coated Products Div, Wheatfield, NY, were: **John F Claydon,** director of the industrial sales branch; and **H P Dales,** industrial sales manager.

Robert E Wolff has been appointed marketing manager of the Tool & Machine Div, Illinois Tool Works, Chicago. He joined the firm's tool sales department in 1941 and ten years later was appointed assistant marketing manager of the division. Mr Wolff conducted a special survey on broaches for the NPA's Metal Working Equipment Div in 1952, while on leave of absence from the organization.

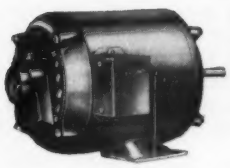
"Ha! You executives ain't the only class subject to ulcers — Doc says I got 'em!"

GET TOP PERFORMANCE FROM YOUR EQUIPMENT . . .

Choose Century MOTORS

From the Wide Range of Types of

In Sizes From 1/8 to 400 Horsepower



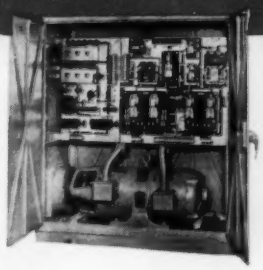
SINGLE PHASE:

Split Phase Induction—⅛, ¼, ⅓ H.P.

Capacitor—⅛ to 20 H. P.
Repulsion start, brush lifting, induction—½ to 7½ H. P.

Write for Bulletin Nos.:

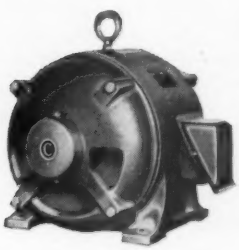
Split Phase 1-5P1
Capacitor 1-1P3
Repulsion Start 2-1P1



SELECTIVE SPEED DRIVE:

A complete line of adjustable speed drives for coordinating all kinds of production processes.

Write for Bulletin No. 11-1P1



POLYPHASE:

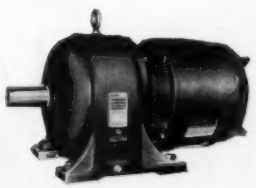
Squirrel Cage Induction—⅛ to 400 H. P.

Wound Rotor Motors—1 to 400 H. P.

Synchronous Motors—20 to 150 H. P.

Write for Bulletin Nos.:

Squirrel Cage, Drip Proof—6-1P1
Squirrel Cage, Splash Proof—6-1P3
Squirrel Cage, Enclosed Fan Cooled—6-1P41
Squirrel Cage, Explosion Proof—6-1P45
Wound Rotor—6-3P1

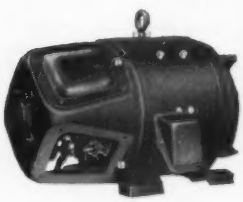


GEAR MOTORS:

⅛ to 15 H. P., single, double and triple gear reduction.

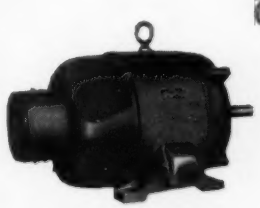
Write for Bulletin Nos.:

⅛ to ¾ H. P. . 4-5P21-61
1 to 15 H. P. . . 4-1P31



DIRECT CURRENT:

All capacities—⅛ to 300 H. P.
Write for Bulletin No. 10-1P1



GENERATORS:

AC, .63 to 250 KVA
DC, .75 to 200 KW

Write for Bulletin Nos.:

AC, .63 to 250 KVA—18-1P21
DC, .75 to 200 KW—18-1P1

CE-825R

Motors listed above are available in Open Rated Drip Proof, Splash Proof, Totally Enclosed Fan Cooled and Explosion Proof frames—and with a dozen different methods of mounting. They are unusually quiet starting and running and unusually free from vibration.

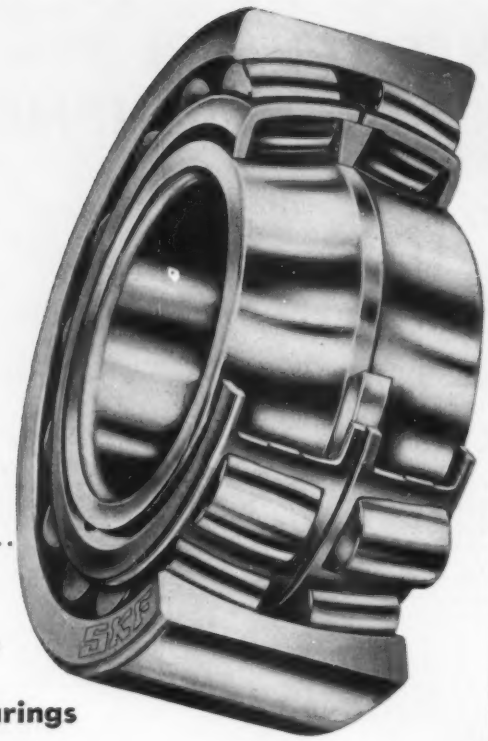
CENTURY ELECTRIC COMPANY
1806 Pine Street, St. Louis 3, Missouri
Offices and Stock Points in Principal Cities

Send the Coupon for Additional Facts

To CENTURY ELECTRIC COMPANY
1806 Pine Street, St. Louis 3, Mo.

Please send me the following bulletins:
(fill in numbers here) .....

Name ..... Title .....
Company .....
Address .....
City ..... Zone ..... State .....



Another **SKF** *"First"...*

now, an SKF improvement in the internal design of Spherical Roller Bearings provides

25% to 50% increased capacity
2 to 3½ times increased service life

Your SKF Distributor can *show* you why, when you replace a bearing with the SKF Type "C" Spherical Roller Bearing, you can expect it to *last* up to 3½ times longer, expect it to provide up to 50% increased capacity, than any other design available.

All the facts—engineering data, capacity and life comparisons, sizes available—are contained in SKF Bulletin No. 365-S. Ask your nearby SKF Distributor for a copy, or write direct to **SKF INDUSTRIES, INC.,** PHILADELPHIA 32, PA. *—manufacturers of* **SKF** *and* HESS-BRIGHT® *bearings.*

7531

SKF®

BALL AND ROLLER BEARINGS

© 1954 SKF INDUSTRIES, INC.

Joseph R McGilvray, assistant to vice president, Westinghouse Electric Corp, has retired after a 30-year career with the company. Mr McGilvray joined the organization in 1924; ten years later he was appointed New England district manager, and in 1946 was made manager of the Pacific Coast district, manufacturing and repair department. Last August he was named to the post he held at the time of his retirement on Jan 29.

Kenneth J Downs has been appointed chief design engineer of Chiksan Co, Brea, Calif, manufacturers of ball bearing swivel joints. In his new capacity, Mr Downs will supervise the design and development section of the engineering department and will direct operation of the test laboratory. He has been with the company for four years as a design engineer.

F H Mott has been appointed administrative vice president in charge of all Eaton Mfg Co (Cleveland) plant operations in Michigan. **R E Fisher** has been named vice president in charge of sales for the corporation. **R H Daisley,** formerly vice president, manufacturing, has been appointed administrative vice president in charge of all plants in Ohio, Kenosha, Wis, and London, Ontario. Mr Mott has been general manager of the Pump Div since 1947; Mr Fisher has headed the Stamping Div, Cleveland, for the past six years.

Jay Morrison has been appointed special assistant to the senior vice president, and **Frank Terdina,** acting manager of the industrial products division at Boeing Airplane, Seattle. Mr Morrison, a member of the firm since 1939 has been manager of industrial products for the past four years. Mr Terdina, who joined Boeing in 1931, has served as engineering manager of the division for the last eight months.

Vanadium-Alloys

announces

a new **FM** series

FREE MACHINING

of free-machining steels*

in the following important tool steel grades

HIGH SPEED STEELS

RED CUT SUPERIOR FM
VASCO SUPREME FM
NEATRO FM
VASCO M2 FM
8N2 FM
VAN-LOM FM

DIE STEELS

OHIO DIE FM
(air hardening, high carbon, high chromium)

CROCAR FM
(oil hardening, high carbon, high chromium)

SPEED CUT
(low distortion die steel, produced since 1947)

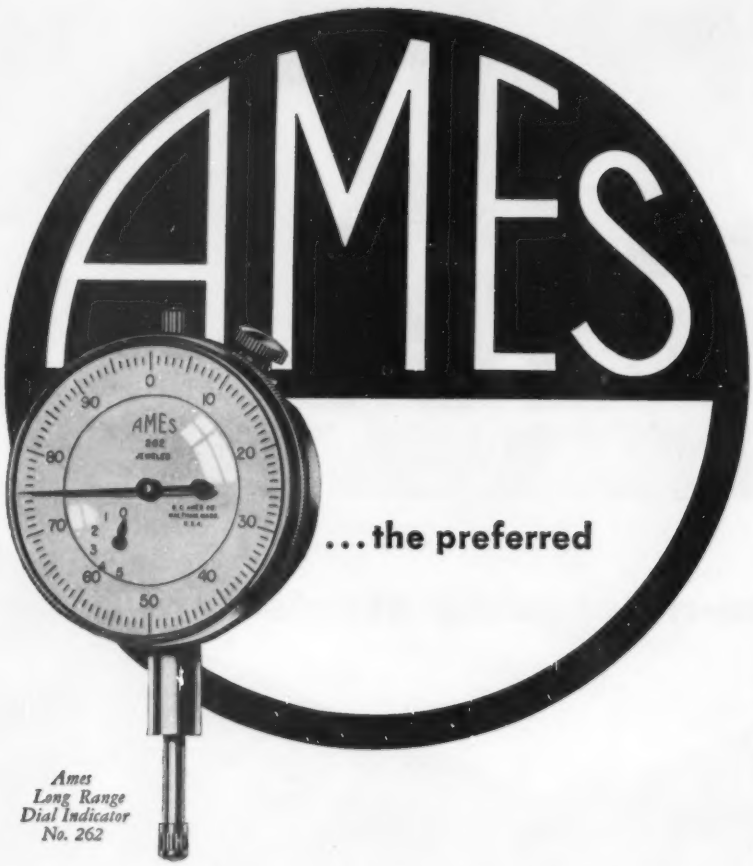
For tool steel applications where *free machining* quality is desirable, we offer this new FM Series. Vanadium-Alloys FM steels machine more easily, permit better machined finish, and in certain instances show improved performance. To obtain free machining characteristics in the nationally-known steels listed above, simply specify the brand name desired, followed by the letters FM.

Complete information on our FM steels is available from your Vanadium-Alloys representative. Ask him for the facts.

*Several grades manufactured under U.S. Patent No. 2,204,283, Simonds Saw and Steel Co.

Vanadium-Alloys
STEEL COMPANY
LATROBE, PA.

COLONIAL STEEL DIVISION • ANCHOR DRAWN STEEL CO.



Ames Long Range Dial Indicator No. 262

... not because they cost more (in the long run they're more economical) but because they're completely *impersonal*. They do their measuring jobs absolutely independent of the human hand.

For more than 50 years, Ames Micrometer Dial Gauges and Indicators have kept pace with increasingly critical precision requirements. Today, each part of every Ames product is carefully built by exclusive Ames methods and machines from the materials best suited to its function — and 100% checked for accuracy. As a result, all Ames products are extremely accurate and sensitive, yet rugged and tough — to give you *longer* service with *less* down-time.

Send today for your free copy of Catalog No. 58

Representatives in principal cities. B. C. AMES CO. *26 Ames Street Waltham 54, Mass.*

Mfgr. of Micrometer Dial Gauges • Micrometer Dial Indicators

Alf E Werolin, formerly vice president in charge of administration and planning, has been named vice president and general manager of National Motor Bearing Co, Redwood City, Calif. He joined the organization in 1951 in the capacity in which he was serving at the time of his promotion.

Martin J Caserio has been named chief engineer, automotive products, of General Motors' AC Spark Plug Div. **Bruce H Schwartz** has been appointed chief engineer, military products, at both Flint and Milwaukee plants. The promotions followed the retirement of **C W McKinley,** chief engineer at AC since 1931. Mr McKinley is being retained on a consulting basis.

J M Tough has been appointed sales manager, Watson-Stillman Fittings Div, H K Porter Co, Roselle, NJ. He joined the firm in 1942, and subsequently was made district manager of the Chicago territory.

R B Thompson has been appointed assistant general manager of manufacture for American Can Co. Mr Thompson, who had previously been manager of manufacture for the company's Atlantic division, has been with the firm for 31 years; he will continue to make his headquarters in New York. **A de Genaro,** formerly assistant manager, succeeds Mr Thompson. **J C Souhan,** who has served as manager of the company's Hillside, NJ, plant, and more recently as assistant to the general manager of manufacture, takes over Mr de Genero's post.

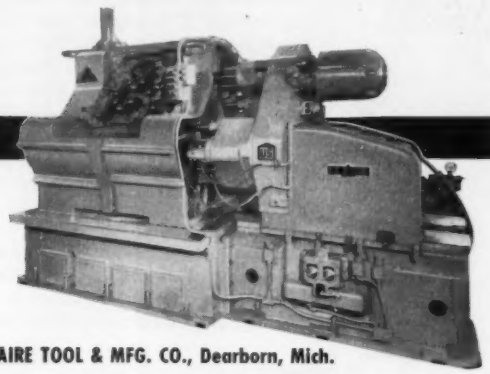
"Some of the boys changed the 'o' to a '3,' and Henry fell for it."

THESE MACHINE TOOL BUILDERS RELY EXCLUSIVELY ON US INDIVIDUAL LEAD SCREW TAPPERS WITH SHAVED GEARS AND THE PATENTED *SAFETY TAP HOLDER*

The U. S. ***Safety Tap Holder*** is the only Tap Holder which automatically re-sets the spindles for continuous machine cycling while preventing tap breakage due to bottom tapping, dull taps or holes not drilled.

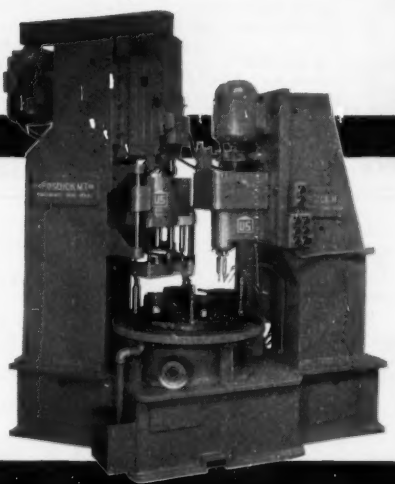
AVEY DRILLING MACHINE CO., Covington, Ky.

This complete tapping machine has provisions for a fifth U. S. Head to be added at a later date. All lead screw tappers are equipped with shaved gears and the U. S. patented ***Safety Tap Holders***.



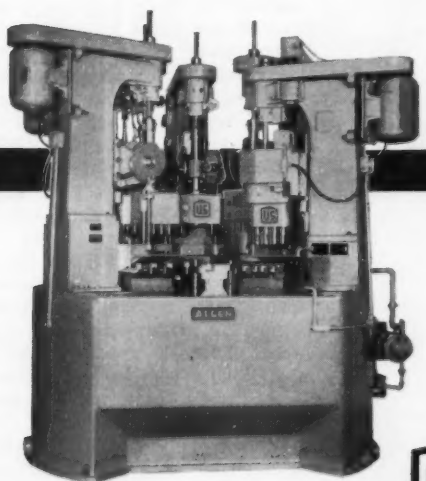
LEMAIRE TOOL & MFG. CO., Dearborn, Mich.

This machine drills, reams, chamfers and taps holes in a crank shaft for a farm tractor engine using a U. S. combination head, having individual lead screws with the U. S. ***Safety Tap Holder*** at the tapping station.



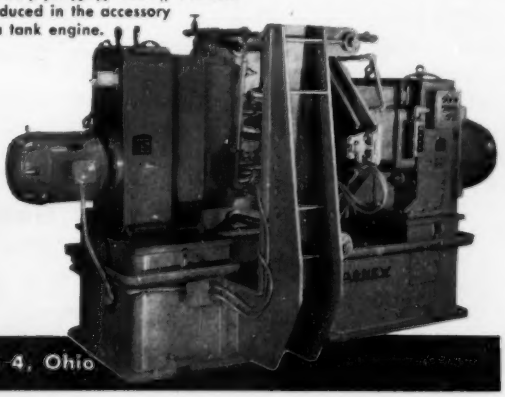
FOSDICK MACHINE TOOL CO., Cincinnati, Ohio

Combination drill and tapping machine still in use after many years, at an automotive accessory plant. Operation performed on a motor sheave.



AGNEW ELECTRIC CO., Milford, Mich.

A complete tapping machine having a total of 76 spindles. One 38 spindle, one 20 spindle and one 18 spindle U. S. individual lead screw tapper. Straight threads ¼-20 to ½-13 and tapered pipe ⅛-¾ class #3 thread were produced in the accessory case of a tank engine.



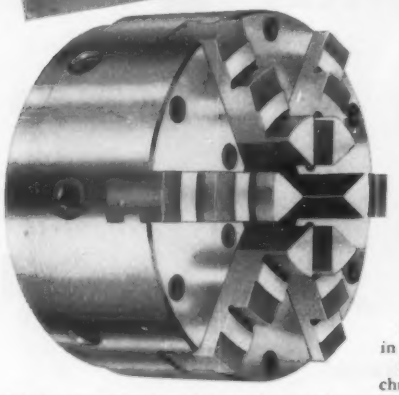
CHARLES G. ALLEN CO., Barre, Mass.

This machine has operated 16 hours per day since 1950, performing a bottom tapping operation in every cycle without a replacement part required on any portion of the lead screw spindle.

US HEADS

U. S. DRILL HEAD CO., 616-618 Burns St., Cincinnati 4, Ohio

YOU SAVE Every Time You Use Buck

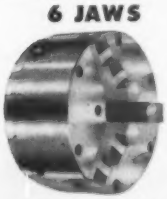


AJUST-TRU Pat. No. 2639157

CHUCKS

This is the only universal scroll chuck with .0005" precision. It is used on lathes, grinders, dividing heads, screw machines. Does most of work formerly requiring stub arbors, mandrels, special fixtures.

6 JAWS



OR 3 JAWS

3-jaw and 6-jaw models in 4", 5", 6", 7½", and 9" sizes. 2-jaw Aviation chucks, for holding odd shaped parts in 6", 7½, and 9".

Save machinists' time — lines up dead true in *one* minute, without shims . . .

Save operators' time — holds .0005" re-chucking precision on duplicate parts . . .

Save collet and step-collet costs — the AJUST-TRU does the work of hundreds of dollars worth of collets . . .

Save distortion on tubular work . . .

Save scratches on ground, polished, work . . .

Save time and expensive holding fixtures on many grinding operations . . .

Save chuck wear — it takes up wear in use . . .

More than ever today, you need the economies of Buck chucks. Send for latest catalog.

BUCK TOOL COMPANY

310 SCHIPPERS LANE • KALAMAZOO, MICH.

Everybody knows this sign

stands for railroad crossings

. . . and smart gear buyers

know this sign CINTI stands for

the best in custom gears.

CINTI "Gears . . . Good Gears Only"

THE CINCINNATI GEAR CO. • CINCINNATI 27, OHIO

NEW BOOKS

HANDY-QUIK TOLERANCES—*By Alexander Michael, Sr. Published by Handy Length Book Co, 1307 17th St SW, Canton, Ohio. 39 pages, 4 x 5½ in., paper bound. Price $1.*

This booklet contains new and quick methods for learning and memorizing industrial fractions and decimal equivalents. It would be particularly useful for technical and vocational high-school students as well as college students pursuing the mechanical courses. There is some doubt whether shop men would be interested in this booklet, because of all the similar charts prominently displayed throughout the shop. In addition, most shop men have come to memorize fractions and decimal equivalents in a short period of time through association with their work.

•

HOW TO ATTRACT AND HOLD ENGINEERING TALENT—*Prepared and published by The Professional Engineers Conference Board For Industry, 1121 Fifteenth St, N W, Washington 5, DC. 60 pages, 6 x 9 in. Paper binding. Price, $2.00, non-members; $1.00, members; quantity discounts for more than 25 copies.*

Because of increasing shortage of engineers in many fields, particularly aircraft and allied manufacture, the organization sponsoring this book has been conducting surveys to see how engineering manpower can be put to work more efficiently, to increase output of engineers without increasing their numbers. This book is the third in the series, and discusses internal methods of increasing engineering efficiency.

Questionnaires were sent to a wide selection of engineers and managements, and replies were received from 200 companies (employing about 1,000,000 people) and more than 1300 engineers, many from the plants whose managements replied, giving a check on attitudes.

Management was asked what it would like (and wasn't getting) in incoming personnel, and what was being done and should be done to remedy the need. Engineers were asked what they wanted in an employer, and what they weren't getting. Management wants more "Humanities," with better ability to communicate. Most engineers enter a job because it satisfies their aptitudes, but this interest quickly gives

Black & Decker
Cases for Comment

MAINTENANCE

(Case History 2117)
B&D Bench Grinders often give more than 10 years constant use...not losing a minute for repairs.

CONSTRUCTION

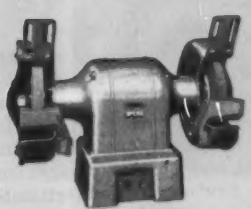
(Case History 4881)
Workers on heavy construction project report B&D Portable Electric Grinders... stand up very well, very handy to use, not awkward nor heavy, give no vibration.

PRODUCTION

(Case History 4092)
This B&D Die Grinder cuts grinding time ⅓ ...does twice the work.

The McDonald Company of Boston, Mass. manufactures galvanized iron and stainless steel equipment. B&D Tools used for approx. 8 years. In addition to Die Grinder they use B&D Shears, Holguns* and Portable Electric Grinders. The Black & Decker Die Grinders have cut the job time by at least ½. Company reports amount of work doubled.

Joe, plant management says that B+D Tools "can take it"
Top management says, "could use more of them"



BENCH GRINDERS
Heavy-Duty models available in 3 sizes, 6", 8", 10". For the finest tool dressing, grinding, wire brushing, burnishing, buffing.

PORTABLE ELECTRIC GRINDERS
In 3 models, 3", 5", 6". All with husky housings and precision parts. Ideal for any job where grinder must be taken to the work.

DIE GRINDERS
2 models. The No. 9 is powered by a new B&D-built motor. Small, only 2½ lbs . . . compact, diameter only 2⅛". Also available, 3" Die Grinder.

Here's Proof that Black & Decker Power Saves *Time and Trouble*

In countless cases where industry needs power, industry's choice is Black & Decker.

In grinders, drills, saws, hammers, screw drivers, industry finds Black & Decker packs the power to get greater production . . . per machine . . . per man-hour.

Why? Because Black & Decker Power is *custom-built* into every B&D Tool . . . power to perform the job the tool is specially designed to do. B&D Tools are driven by B&D-built motors. Built with precision parts and husky housings (in the most advanced designs) every B&D Portable Electric Tool can be relied upon to give long service with less trouble. Every one is a profit-making production tool. And the facts prove it.

Find out for yourself. Next time the job calls for power, call on Black & Decker to supply it. Call your B&D Distributor for a demonstration. And write for free detailed catalog. Address: THE BLACK & DECKER MFG. CO., 604 Pennsylvania Ave., Towson 4, Md.

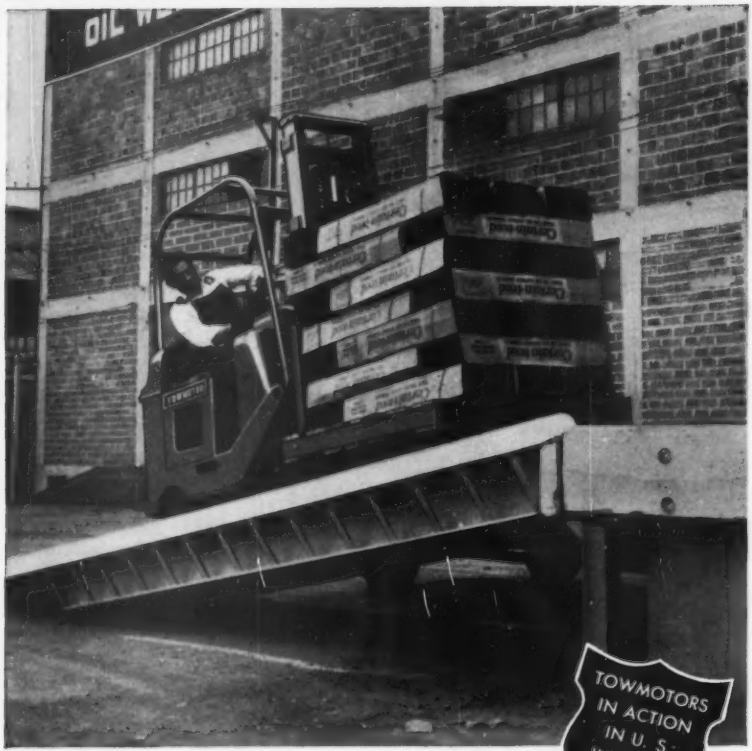
See "TOOLS-ELECTRIC"

LEADING DISTRIBUTORS EVERYWHERE SELL

Black & Decker
PORTABLE ELECTRIC TOOLS

* Trade Mark Reg. U. S. Pat. Off.

BIG PUSH FOR PROFITS



Up a steel ramp with a full load of roofing material at Alamo Iron Works, San Antonio, Texas.

With production costs up in every industry, it's *drive, drive, drive* every inch of the way to maintain profits. Many firms are doing it by slashing their materials handling costs with Towmotor **M**ass **H**andling Equipment. Towmotor Fork Lift Trucks speed production, stop manhour leakage, increase capacity. Join the big push for profits with Towmotor Equipment!

Write for "What Makes It Tick?," the inside story of Towmotor. Towmotor Corporation, Division 5603, 1226 E. 152nd St., Cleveland 10, Ohio.

TOWMOTOR
THE ONE-MAN-GANG ®

FORK LIFT TRUCKS and TRACTORS
Since 1919

TOWMOTOR ENGINEERED FOR QUALITY PERFORMANCE

way to a desire for more security and somewhat higher salaries. It is a little hard for an engineer to justify working several years and paying a considerable sum of money for an education, and find that the average production worker is being paid at least as much money for a job requiring considerably less responsibility and technical skill.

Aside from a slight preoccupation with anxiety to have the average engineer thought of as more "professional," a term which is only briefly explained, the people who put this book together have done a good service toward making it easier for plant management to make engineering personnel more useful and happy in their work. The book is one very thorough and practical guide to the problem of the current shortage of engineering personnel.

•

MECHANICAL WORLD ELECTRICAL YEAR BOOK 1954—*Published by Emmott & Co, Ltd, 31 King St West, Manchester 3, England. 412 pages, 6¼x4 in. Price 3 shillings (45 cents).*

Principal change in this year's edition of an old-established reference book is the inclusion of a section on the electrical equipment of automobiles. This covers the various types of electrical components, their operation, and wiring arrangements. Another new section, unfortunately rather too brief, deals with safety precautions to be taken in the use and handling of electric power tools.

General changes have been made throughout, and the table of horsepower required to drive machinery has been extensively revised from new data supplied by a large motor company. Notes on installation tests and ground-leakage trips have also been revised.

•

MECHANICAL WORLD YEAR BOOK *1954—Published by Emmott & Co, Ltd, 31 King St West, Manchester 3, England. 624 pages, 6¼x 4 in. Price 3 shillings, six pence (50 cents).*

Two important new sections have been added to this year's edition. One comes at the centenary of the birth of C A Parsons, inventor of the axial-flow turbine, and the centenary of W J M Rankine's introduction of the ideal steam cycle. It deals with a review of progress in the steam cycle and the performance of steam-turbine plants. The second new section covers the various methods of metal finishing and ranges from

IT'S QUIET

because it's

SUPER-SONIC!

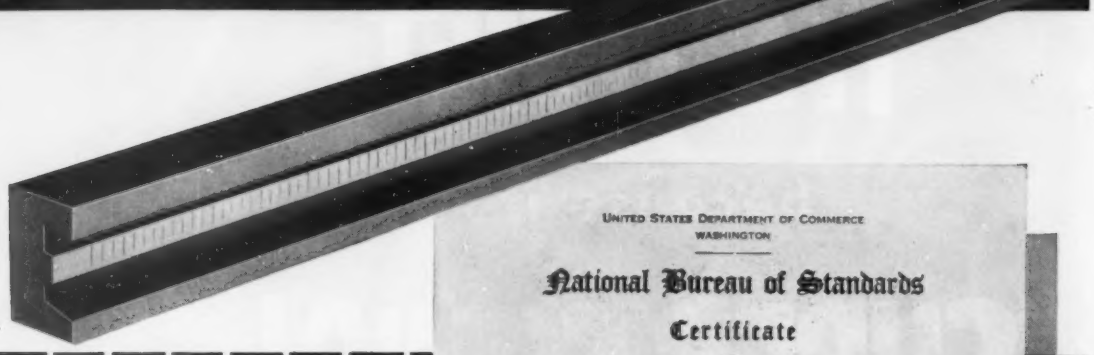
Chicago Pneumatic's new CP-3008 is a really quiet air-powered screwdriver. Its Super-sonic exhaust changes sound waves to a frequency which approaches the limit of human hearing. Of rugged, all-steel construction, it weighs only 1 lb. 14 oz. . . . has a side outlet exhaust deflector that rotates and locks in any position for directional exhaust. Has built-in speed control for precision driving on delicate work. Torque can be easily adjusted without special tools. Handles #4, #6 and #8 screws . . . will handle some #2's and #10's. Write for Bulletin SP-3096. *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, N. Y.*

Chicago Pneumatic

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

This is one of the **standard scales**
which ensure the exceptional and permanent accuracy
of the coordinate settings of the

Hydroptic-6



A most valuable testimonial

Since more than 80 years, the Société Genevoise, Geneva, have supplied length standards to all prominent metrological institutes where they constitute the basis of all linear measurements.
Their unexcelled precision has been repeatedly acknowledged by the highest instances. The certificate illustrated at the right has been issued by the National Bureau of Standards, Washington. It relates to a SIP 40-inch standard scale the calibration of which showed that the total error of the division on the full length was only .00001 inch, a figure which requires no further comment.

UNITED STATES DEPARTMENT OF COMMERCE
WASHINGTON

National Bureau of Standards

Certificate

for

40-inch Steel Bar

Maker: Société Genevoise d'Instruments de Physique.
Maker's No. 2850

Submitted by

Société Genevoise d'Instruments de Physique,
Geneva, Switzerland.

This bar has been compared with the standards of the United States, and a calibration has been made of the one-inch sub-intervals. The results obtained are as follows:

Length of the interval from the zero to the 40-inch line at 20° centigrade, with the bar supported at the points of Bessel:

40.00001 inches.

The observations were made at a mean temperature of 20.04° centigrade and in reducing to 20° centigrade, the coefficient of linear expansion of 0.0000115 per degree centigrade was used.

Calibration of Sub-intervals.
Length of sub-intervals at 20° centigrade.

Interval (inches)	Length (inches)	Interval (inches)	Length (inches)
(0 to 1)	1.00000	(0 to 21)	20.99996
(0 to 2)	2.00001	(0 to 22)	21.99997
(0 to 3)	3.00003	(0 to 23)	22.99997
(0 to 4)	4.00003	(0 to 24)	23.99997
(0 to 5)	5.00002	(0 to 25)	24.99998
(0 to 6)	6.00001	(0 to 26)	25.99999
(0 to 7)	6.99998	(0 to 27)	26.99998
(0 to 8)	8.00001	(0 to 28)	27.99997
(0 to 9)	8.99997	(0 to 29)	28.99998
(0 to 10)	9.99997	(0 to 30)	29.99997
(0 to 11)	10.99999	(0 to 31)	30.99997
(0 to 12)	11.99998	(0 to 32)	31.99996
(0 to 13)	12.99999	(0 to 33)	32.99998
(0 to 14)	14.00000	(0 to 34)	33.99999
(0 to 15)	14.99997	(0 to 35)	34.99998
(0 to 16)	15.99997	(0 to 36)	35.99998
(0 to 17)	16.99998	(0 to 37)	37.00000
(0 to 18)	17.99996	(0 to 38)	38.00002
(0 to 19)	18.99996	(0 to 39)	38.99998
(0 to 20)	19.99993	(0 to 40)	40.00001

Test No. 2.4/125714

SIP

Synonymous with unexcelled accuracy

Total error of the division on the full length of 40 in. : .00001 in.

REPRESENTATIVE FOR U.S.A. AND CANADA:

AMERICAN SIP CORPORATION

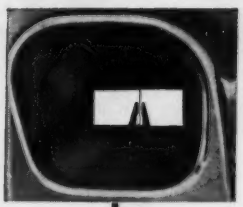
HIGH PRECISION MACHINE TOOLS AND MEASURING EQUIPMENT

100 East 42nd Street NEW YORK 17, N.Y.

Power... Speed... Precision...

SIP Jig Borers are today the key machines in every progressive works where accuracy and reliability are primary essentials.

The SIP Hydroptic-6 Jig Boring and Milling Machine, of new design, is the last word in jig borer technique. It features an exceptional robustness and versatility, permitting heavy duty work as well as the finest machining operations to be performed at amazing rates of production.



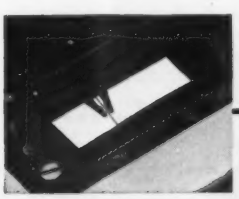
SIP Jig Borer

Hydroptic-6

with projection screens

SPECIFICATION

Working range ..... 40" x 28"	Spindle speeds.. 40 to 2000 rpm.
Table surface ..... 43 ¼" x 33"	Boring capacity, dia. ..... 12"
Distance between uprights 43 ¼"	Spindle quill travel ..... 10"
Table to spindle end ... 35 ½"	Net weight ..... 15,500 lbs.



Guaranteed accuracy for all coordinate settings: .00015 in.

A17

MILLERS FALLS "BLU-MOL"®

Here is the greatest high-speed power blade ever developed for general all-purpose hacksawing. *In actual tests,* even on the toughest sawing jobs, "Blu-Mol" delivers up to 50% more cuts per blade.

That's because "Blu-Mol" blades are machined from a specially-selected high-speed steel — and precision heat-treated by an exclusive Millers Falls process. The result is a blade of extreme tooth hardness and toughness, with a stubborn, long-lasting resistance to abrasion *on any machinable material.*

Write for details on "Blu-Mol" power and hand Hack Saw Blades, and "Blu-Mol" high-speed, welded-edge Hole Saws. All bring you the same unique qualities that are setting records for performance and economy in thousands of plants.

MILLERS FALLS COMPANY
Dept. AM-1, Greenfield, Mass.

The world's broadest, most highly-developed line of metalcutting saws

MILLERS FALLS TOOLS
SINCE 1868

The Mark of Superiority

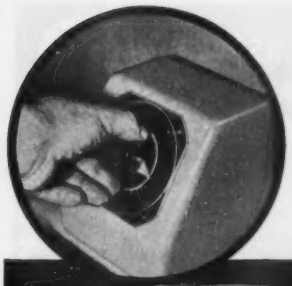
chemical surface treatment, through hot-dip coatings, painting, plating, and enameling, to metal spraying. Cleaning and polishing are also covered, and a brief outline of each of the various processes is given. To keep within the physical limitations of the book, each process is dealt with in one or two paragraphs, but sufficient information is given to permit the reader to grasp the fundamentals.

•

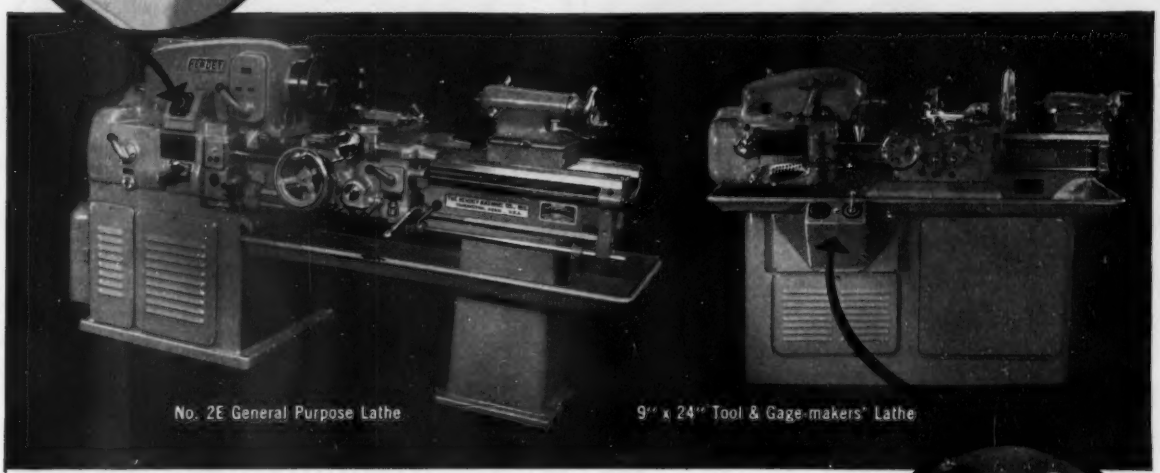
ASME HANDBOOK OF METALS ENGINEERING DESIGN—*Sponsored by the Metals Engrg Handbook Board, ASME. Published by the McGraw-Hill Book Company, 330 W 42nd St, New York 36, NY. 405 pages, 7¼ x 10 in. Price $10.*

Data for design functions are concentrated in this new volume, contributed to by many authorities. It contains 48 sections, covering such subjects as fatigue characteristics, wear considerations, impact, corrosion, non-destructive testing, elasticity, theories of failure, and the like. It is the first of four volumes to comprise the Handbook, the others to cover metals properties, engineering tables, and processes. The project was originated in 1941, has been actively under way since 1945.

The book is in six parts, a short one on material selection, and others on mechanical properties of materials, mechanical factors influencing corrosion, metallurgical factors, processing considerations, and design procedures. In each case, the individual elements are prepared by acknowledged authorities, so the result is a compilation of considerable stature. It brings together into one volume a great deal of reference data formerly scattered through many references.



simplifies machine operation ...saves production time



Finger Tip Control of infinite spindle speeds

This outstanding control is featured on two lathes—the new Hendey No. 2E 14" general purpose precision lathe and the Hendey 9" x 24" tool and gage-makers' lathe. It gives infinitely variable spindle speed control through the full range . . . permits adjustments under cut or pre-setting to the most efficient speed.

The Hendey-proved electronic control of the drive motor reduces operator effort to simple speed selection . . . responds immediately to his every spindle speed requirement. Instantaneous electric dynamic braking, plus start, stop, and reverse, are one-lever controlled at the headstock and apron. Hendey finger tip control can save up to 25% production time . . . really cutting turning costs.

Spindle speeds range from 25–3000 R.P.M. on the Hendey 9" x 24", and from 15–1500 R.P.M. on the Hendey No. 2E. Both lathes also feature induction hardened and precision ground bedways . . . precision lead screws . . . convenient grouping of operating controls . . . plus traditional Hendey built-in quality and precision.

infinite speed control

●

speed selection pre-set or while cutting

●

induction hardened and ground bedways

●

precision built

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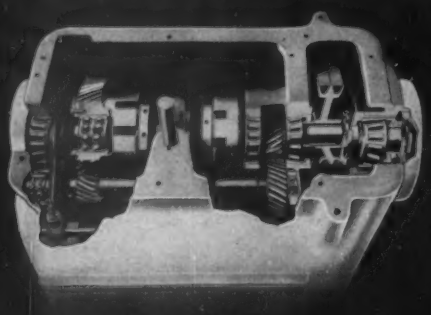
Acme's complete facilities include over one hundred major machine tools.



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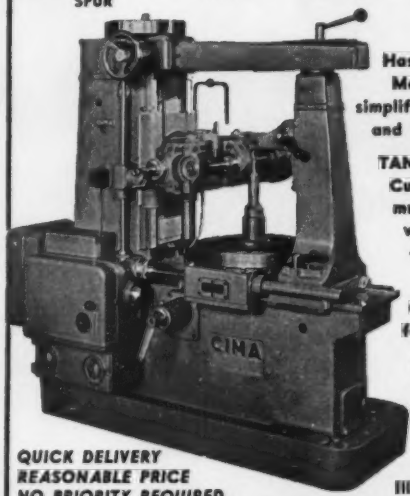

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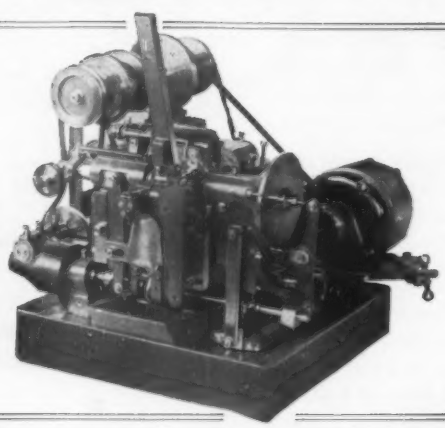

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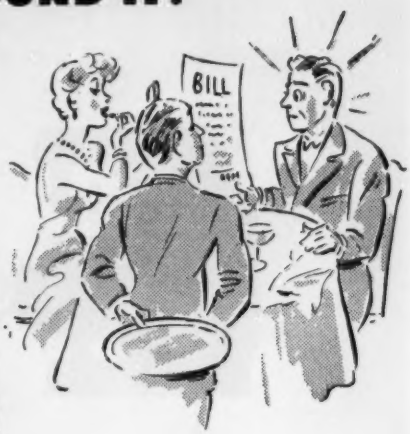

In All These 18 Applications De Laval Purification Pays Off!

Almost every metalworking plant has one or more operations where an adequate supply of clean, dry oil is a virtual necessity. 18 such applications are suggested in the panel and in every case a De Laval Oil Purifier provides the quickest, low-cost method of keeping these oils ***clean*** and ***dry***.

Clean oil is the prime requisite in most cases. Because of the greater intensity of centrifugal force, De Laval machines are more thorough than any other means. They remove every bit of dirt, abrasive or metallic particles. Thus, cutting oil can be used safely over and over again, with increased tool life and possibly less dermatitis among the men. Dies last longer when drawing oil is centrifuged; tests are more reliable when testing oil is purified.

Dryness can be a most vital consideration, as in the case of slushing compound purification. Here, too, De Lavals do the best work, quickest and most thoroughly. Water removed from the oil is continuously discharged—cannot possibly lead to recontamination.

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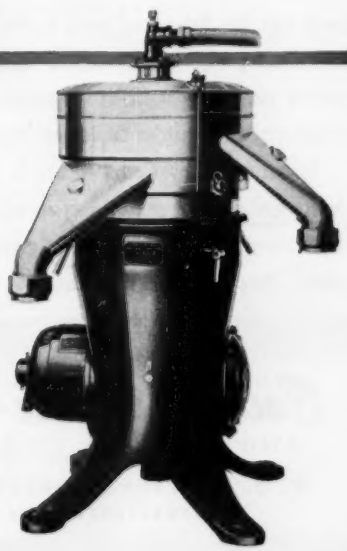

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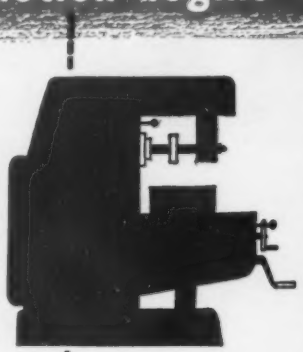

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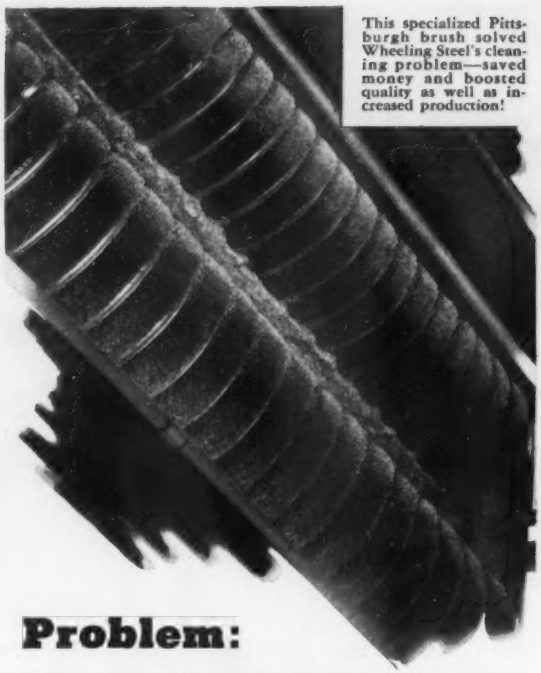

This specialized Pittsburgh brush solved Wheeling Steel's cleaning problem—saved money and boosted quality as well as increased production!

Problem:
How to be tough and soft at the same time!

That was the problem presented to the Pittsburgh Plate Glass Company by the Steelcrete Division of Wheeling Steel, Beech Bottom, W. Va.—and it required a specialized Pittsburgh brush to solve it!

Large sheets of expanded metal had to be cleaned without impairing the surface texture, yet the brush had to cut through tough scale and remove burrs. A special steel wire was chosen, made up into brushes, and applied to the problem. Result? Combining the right amounts of toughness AND softness, the brush completely eliminated burrs in a matter of minutes, leaving the face of the metal unharmed. Moreover, cleaning is quicker and costs less than with other brushes!

WRITE TODAY for your free copy of our new booklet that shows, thru actual case histories, how Pittsburgh can help cut *your* brushing costs. Address: Pittsburgh Plate Glass Company, *Brush Div.*, Dept. W-9, 3221 Frederick Ave., Baltimore 29, Md.

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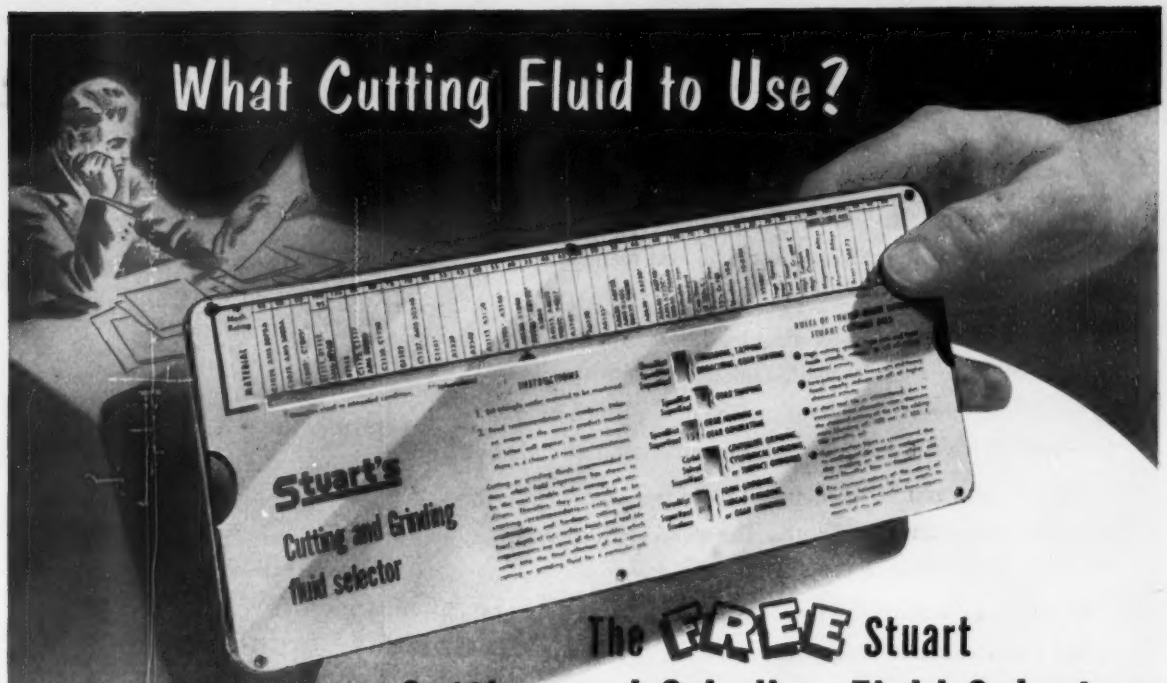
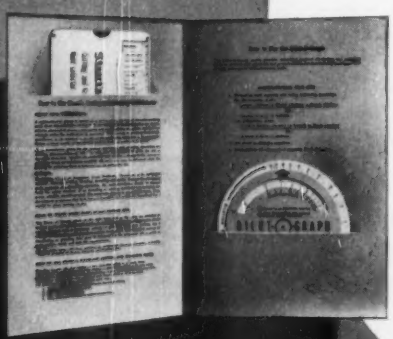
What Cutting Fluid to Use?



The FREE Stuart Cutting and Grinding Fluid Selector has the answer

There is a right cutting fluid for every cutting and grinding job . . . and sometimes it's hard to know where to start in selecting one. For that reason Stuart has developed this FREE Cutting and Grinding Fluid Selector. It's a ready reference that recommends cutting and grinding fluids that field experience has shown to be most suitable under average job conditions. In your hand it's a quick guide to starting recommendations for any job.

Send for your Stuart Cutting and Grinding Selector today. Remember, more than a "coolant" is needed . . . let the Stuart Selector help you get the right cutting fluid to give you the best results.



Stuart's Cutting and Grinding Fluid Selector and Dilut-O-Graph Folder

This handy folder contains a Stuart Cutting and Grinding Fluid Selector and a Dilut-O-Graph . . . a circular slide rule that makes the diluting of cutting fluids quick and easy. They are double-barreled assurance of having the right cutting fluid on all jobs.

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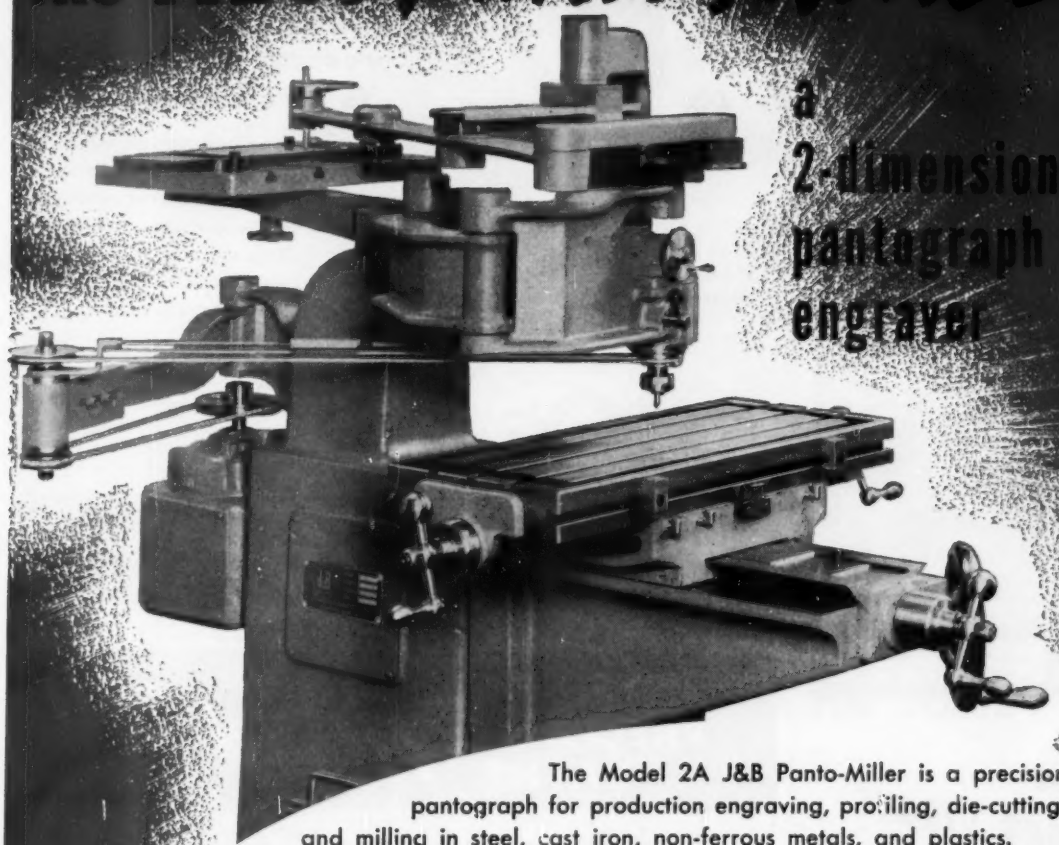
a 2-dimensional pantograph engraver



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Accurate reduction ratios from 1:1 to 1:40 are readily set. Spindle speed is infinitely variable from 1200 to 11,500 rpm at the twist of a dial . . . *without* belt changing!

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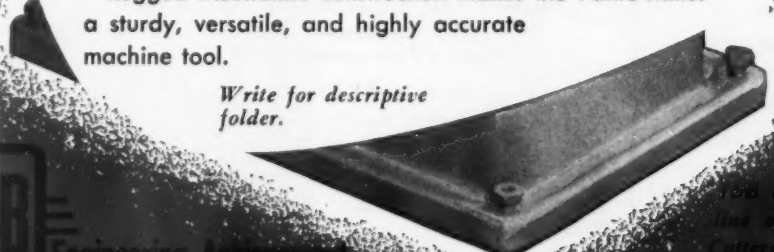

Another J&B Engineering Achievement

We also offers a complete line of Master Copy Type, Cutters, Cutter Grinders, and other pantograph accessories.

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IT'S THE LONG STROKE UNIT!

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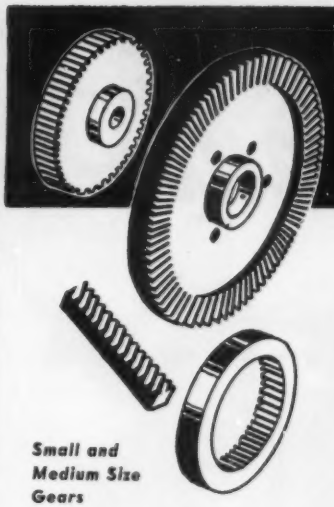

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produced promptly to specifications

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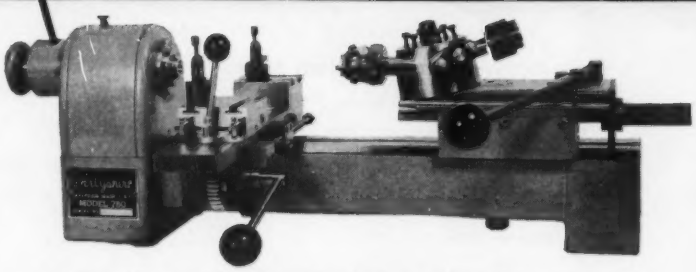

Lathe, 22" bed, Ball Bearing Headstock with Lever-Collet Closer, Pt. ‡3804, with Double Compound Slide Rest, Pt. ‡3652 and Six-position, self-indexing and semi-automatic Turret, Pt. ‡3610.

SPECIFICATIONS

Overall Length With Lever Chuck Closer	25"
Length of Bed	22"
Height to Top of Headstock	8½"
Height to Top of Lathe Bed	4"
Width of Bed	2⅞"
Width of Ways	1-13/16"
Swing over Bed	5.905" (15 cm)
Swing over Compound Slide Rest	2⅛"
Distance between Centers	12"
Center Height	2.953" (7.50 cm)
Maximum Collet Capacity	.315 (5/16")-(ø8 metric)
Maximum Spindle Speed	18,000 RPM
Concentric Running of Ball Bearing Headstock Spindle	.0002"
Spindle Speeds with Variable Speed Drive:	
With Pulley Ratio 1 to 1	600 to 5,000 RPM
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with exclusive bronze-on-steel design

Gone are the headaches and high costs of bushing failures in your die sets when you install Lamina Guide Bushings.

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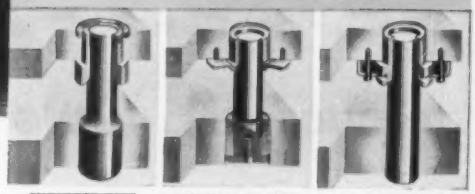

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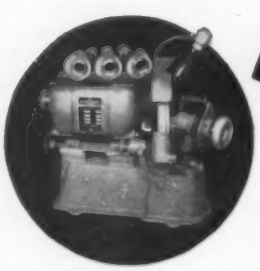

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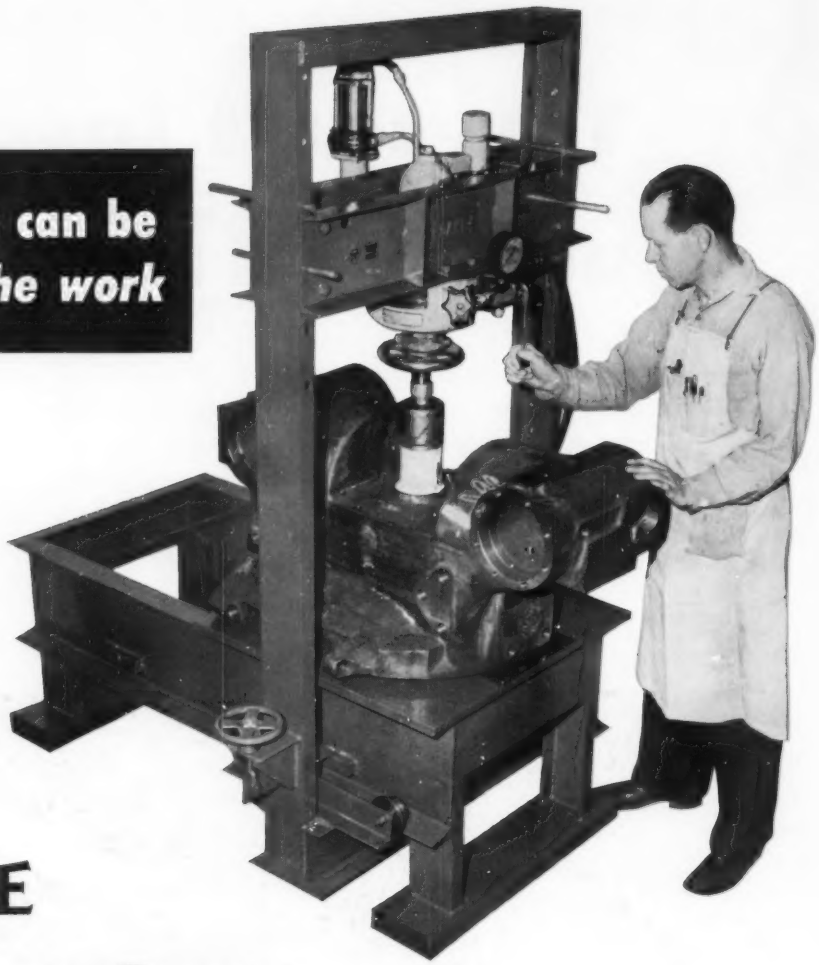

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make awkward, hard-to-handle jobs easy

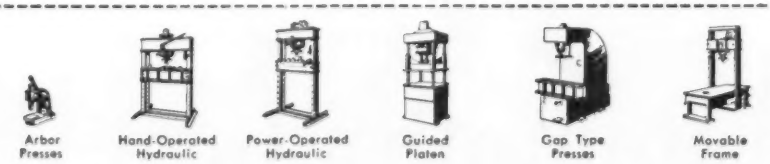
Here is the hydraulic press you need for work on awkward, heavy parts, and for handling large straightening jobs. Parts can be loaded on the work table with a hoist or fork truck—then the frame and workhead are centered over the job. The channels and workhead are easily raised or lowered if necessary to accommodate for work height.

DAKE Hydraulic Presses with movable frames are designed for hand, pneumatic, or electric operation. Capacities range from 25 to 300 tons. For detailed information, write for Bulletin 269.

In addition to conventional hand, air and electric hydraulic presses, Dake makes gap type, guided platen, and other special purpose presses.

Dake Engine Company, 636 Seventh St., Grand Haven, Mich.

DAKE PRESSES



Arbor Presses | Hand-Operated Hydraulic | Power-Operated Hydraulic | Guided Platen | Gap Type Presses | Movable Frame

Once is not enough!

The need for blood is greater than ever, not only for men wounded in combat, but here at home . . . to cure disease, to meet accidents and disasters, and to prepare for civil defense.

Our quota can ONLY be met, if those who give *keep on* giving . . . regularly!

You CAN give more than once . . . as often as every three months with complete personal safety. The more often you give the more often you save a life. For every pint of blood you give goes to someone who needs it desperately.

Remember . . . once is NOT enough. Give blood again and again! Call your Red Cross, Armed Forces or Community Blood Donor Center for an appointment to give blood today.

GIVE BLOOD

...give it again and again

BUSINESS EXECUTIVES!

CHECK THESE QUESTIONS

If you can answer "yes" to most of them, you—and your company—are doing a needed job for the National Blood Program.

- ◯ HAVE YOU GIVEN YOUR EMPLOYEES TIME OFF TO MAKE BLOOD DONATIONS?
- ◯ HAS YOUR COMPANY GIVEN ANY RECOGNITION TO DONORS?
- ◯ DO YOU HAVE A BLOOD DONOR HONOR ROLL IN YOUR COMPANY?
- ◯ HAVE YOU ARRANGED TO HAVE A BLOOD-MOBILE MAKE REGULAR VISITS?
- ◯ HAS YOUR MANAGEMENT ENDORSED THE LOCAL BLOOD DONOR PROGRAM?
- ◯ HAVE YOU INFORMED EMPLOYEES OF YOUR COMPANY'S PLAN OF CO-OPERATION?
- ◯ WAS THIS INFORMATION GIVEN THROUGH PLAN BULLETIN OR HOUSE MAGAZINE?
- ◯ HAVE YOU CONDUCTED A DONOR PLEDGE CAMPAIGN IN YOUR COMPANY?
- ◯ HAVE YOU SET UP A LIST OF VOLUNTEERS SO THAT EFFICIENT PLANS CAN BE MADE FOR SCHEDULING DONORS?

Remember, as long as a **single** pint of blood may mean the difference between life and death for **any** American . . . the need for blood is **urgent!**

NATIONAL BLOOD PROGRAM

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FRICTION SAWING

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The ease and speed with which these machines cut through sheets of soft or hard steel, non-ferrous metals, plastics and many other materials provides marvelous opportunity for increasing production and lowering costs. And for cutting formed parts, or trimming castings, there's nothing to compare with it, for the down-drag of the saw is so negligible that in most cases no jig or rest whatsoever is required. Get the complete facts, NOW!

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. . . and this Boeing case history of what intelligent investment in new machinery can accomplish is just one of hundreds in your 1954 PRODUCTION PLANBOOK for Metalworking issue of *American Machinist*.

Have you studied the new PLANBOOK yet? If not, do so now. There's no other way to know *how much* this great issue can do to help you for years to come.

The 1954 PLANBOOK, which you received in November as part of your regular *American Machinist* subscription, features a new *American Machinist* Inventory of Metalworking Production Equipment, with details of how much metalworking equipment is in use in the U.S., *where* it is, and *how old* it is. In addition, there are big sections dealing with how you can determine when to replace old machinery profitably, and there are literally thousands of actual facts and figures telling what can *and has been done* through efficient modernization.

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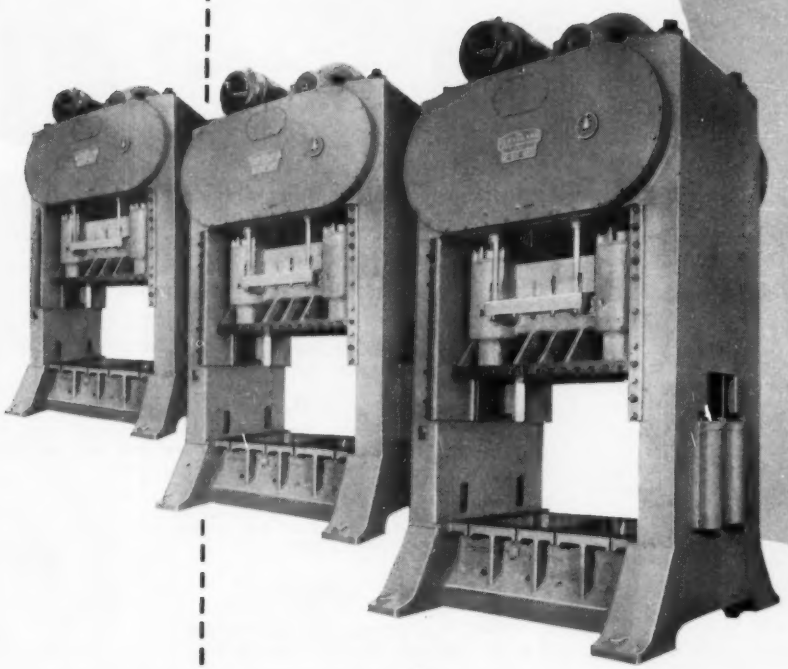

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Here are economical, sales-building methods that produce more attractive products

SUPPLIES UP - TO - DATE INFORMATION ON:

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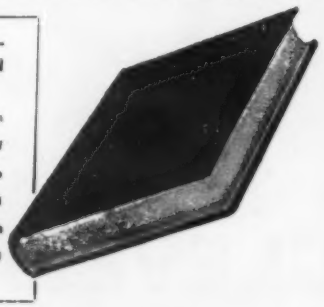
- —the sales value of attractive finishes
- —the economics of metal finishing
- —the design of parts which require finishing
- —new finishing equipment and processes
- —metal finishing costs



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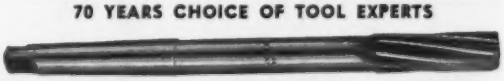

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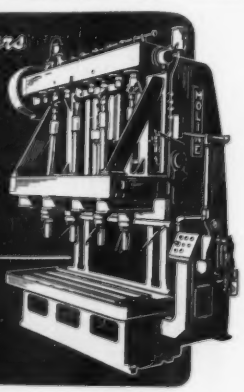

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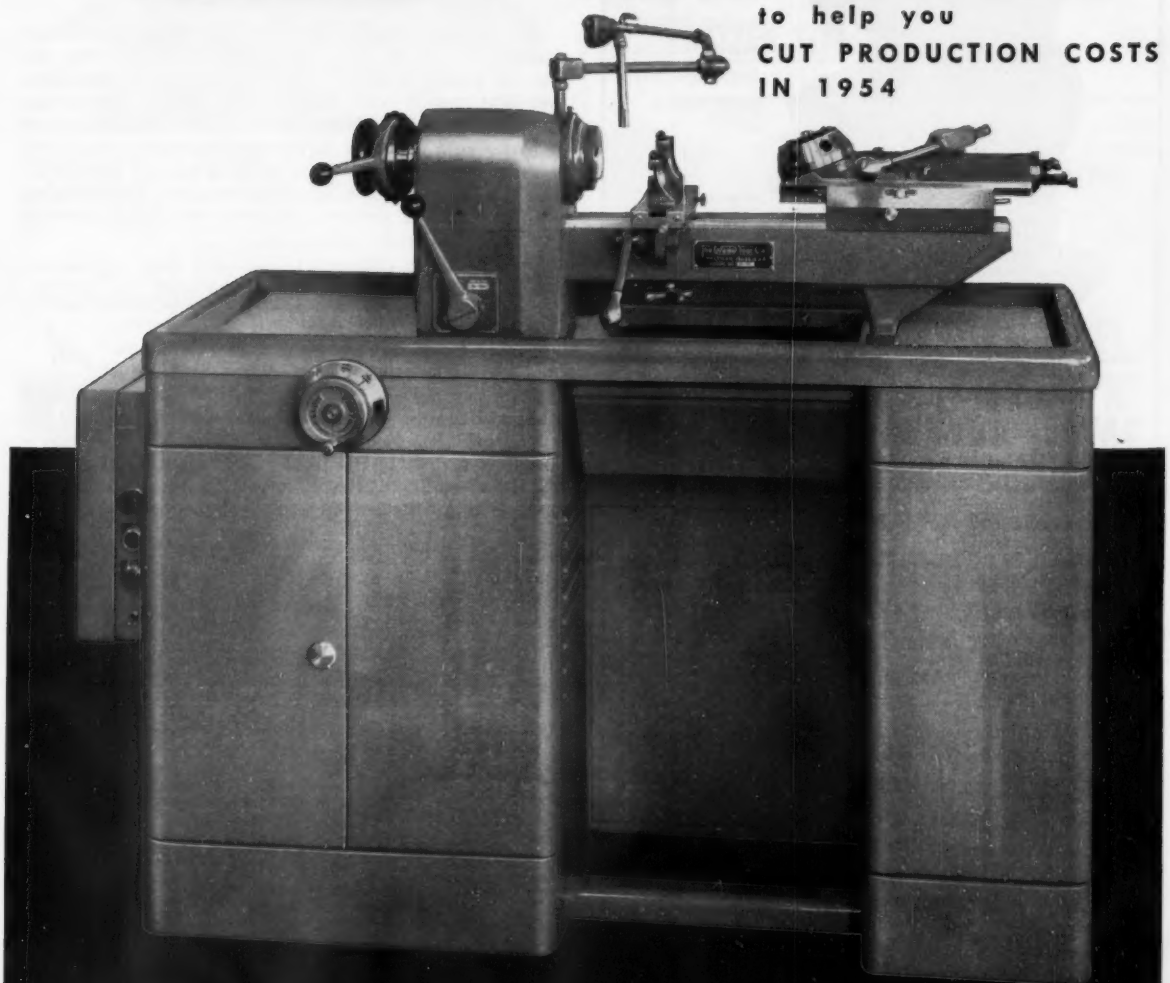

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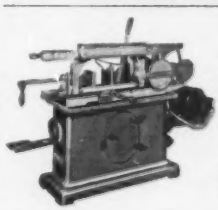

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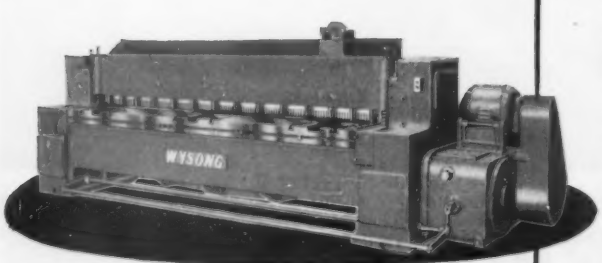

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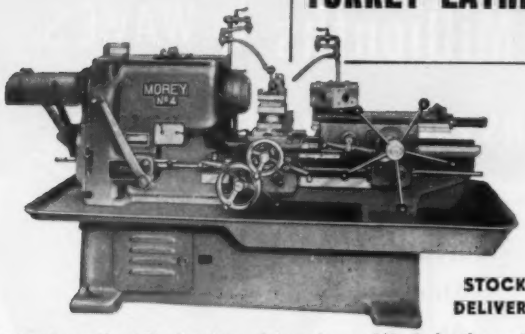

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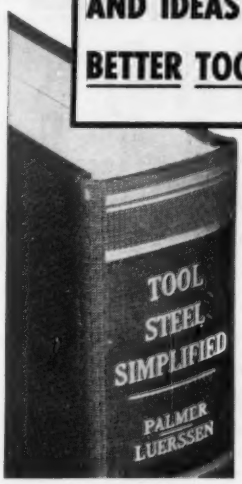

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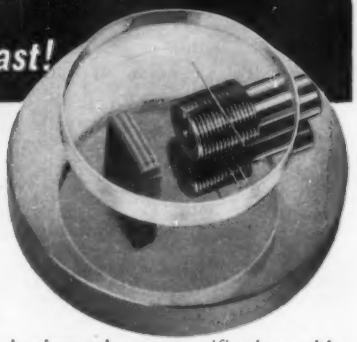

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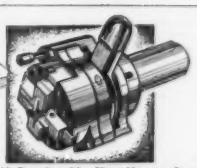

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Classified Advertising Division
AMERICAN MACHINIST
330 West 42nd St., New York 36, N. Y.

SEARCHLIGHT SECTION

(Classified Advertising)

EMPLOYMENT, BUSINESS: **"OPPORTUNITIES"** EQUIPMENT, USED OR RESALE

UNDISPLAYED —RATES— DISPLAYED

$1.50 per line, minimum 3 lines. To figure advance payment count 5 average words as a line.

Position Wanted advertising rates are ½ the above rate payable in advance.

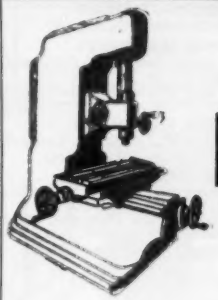
Box Numbers—counts as 1 line.

Discount of 10% if full payment is made in advance for 4 consecutive insertions.

Individual Spaces with border rules for prominent display and advertisements.

The advertising rate is $12.60 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

An advertising inch is measured ⅞" vertically on a column—3 columns—60 inches to a page.



SEARCHLIGHT Equipment Spotting SERVICE

This service is aimed at helping you, the reader of AMERICAN MACHINIST, locate used and surplus new metalworking machinery and equipment not currently advertised. (This service is for user-buyers only.)

First, read the dealer ads on the following pages. A 5-minute study may locate the equipment now.

Second, send in the specifications of the equipment wanted on the coupon below, or on your own company letterhead, to

Searchlight Equipment Spotting Service
c/o American Machinist
330 W. 42nd St., N.Y. 36, N.Y.

Your requirements will be brought promptly to the attention of the used equipment dealers advertising in this issue. You will receive replies directly from them.

NO CHARGE • NO OBLIGATION

Searchlight Equipment Spotting Service
c/o American Machinist
330 W. 42nd St., New York 36, N. Y.

Please help us locate the following used equipment:

.....

.....

.....

.....

NAME ..... TITLE .....

COMPANY .....

STREET .....

CITY ..... ZONE ..... STATE .....

8/1/54

1941-1954 MACHINE TOOLS

CUTTER & TOOL GRINDERS
FELLOWS: Flat Top Helical Gear Cutter Grinder
OLIVER: 10" Template Tool Bit

DRILLING MACHINES
ALLEN: No. 2 Drill—6 Spindle, 8" overhang
ALLEN: #2 High Speed 15"
BARNES: No. 210, 2-spindle, 21" Swing
PRATT & WHITNEY: ½B x 50 Deep Hole Drilling & Reaming Machine, 2-spindle
RADIAL DRILLS: Archdale, 5', 6' & 7', new

GEAR MACHINERY
FELLOWS: 61A Shaper, 18" dia.
FELLOWS: 64A Shaper, 18" dia.
FELLOWS: Flat Top Helical Gear Cutter Grinder
FELLOWS: Straight Line Generator, 3" dia. with many cutters
GLEASON: #12 Rough & Finish Gen.
GLEASON: 3" Straight Bevel Gear
SYKES: Rack Cutting Machine 12" to 36" length capacity (New)
PRATT & WHITNEY: Gear Grinder, 10" single and double wheel, hydraulic feed
GEAR GRIND MACH: GG-19, 10"x24" Hydr. Spur Gears and Splines
INTERNAL GEAR GRINDER, GG-31

GEAR TESTERS
FELLOWS: 8 LSI and 13 LSI Gear Lappers, external and internal spur and helical
FELLOWS: #12C Cone & Spacing Inspection Instrument
GLEASON: No. 3 Bevel Gear Tester
GLEASON No. 4 and No. 6 Bevel Gear Testers, Hand and Power
NATIONAL BROACH: SIC-12" Red Ring Gear Testing Machine

GRINDERS—CYLINDRICAL
BROWN & SHARPE: No. 10 cap. 6"x18" plain
CINCINNATI, 6"x18" Hydraulic, Plain
LANDIS: 16x32" Type "D" Crankpin, hydraulic, for grinding crankshafts

GRINDERS CYL.—*continued*
NORTON: 12"x36", Type C, Universal
NORTON: 10"x36", 30 Deg. Angle Wheel Head
NORTON: 10"x18" 45° angle wheel

GRINDERS—GEAR & SPLINE
GEAR GRIND MACH.: GG-19, 10"x24" Hydr. Spur Gears and Splines
PRATT & WHITNEY: 10" single and double wheel, hydraulic feed
INTERNAL GEAR GRINDER, GG-31

GRINDERS—INTERNAL
BRYANT: 16-16 Internal Hydraulic

GRINDERS—RADIUS
VAN NORMAN: #73, capacity 7½"
VAN NORMAN: #649-16, cap. 6" to 16" dia.
VAN NORMAN: #3½ Un. Radius

GRINDERS—THREAD
EXCELLO: #31 External, dia. 5"x18"

HONING MACHINES
MICROMATIC: H-510 Double End Horizontal, ¾" to 2" dia.
MICROMATIC: H-2 Single End Horizontal, 2 spindle, ¼" to 1" dia.

LAPPING MACHINES
FELLOWS: 8 LSI and 13 LSI Gear Lappers, external and internal spur and helical

LATHES—PRODUCTION
BLOUNT: Polishing speed lathe 12" dia. x 48" centers
LODGE & SHIPLEY: #3A Duomatic, 25½" swing x 27" centers

LATHES—TURRET
BULLARD: 36" Vertical turret
WARNER & SWASEY: #1A, #2A, #3A & #4A
WARNER & SWASEY: #3, #4 & #5
HERBERT: #0, #2, #4, #7, #8 and #9B/30 Sizes, new
WEBSTER & BENNETT: Vertical Turret Lathes 36" & 48" (New)

MILLING MACHINES
SUNDSTRAND #1 RIGIDMIL
TAYLOR-FENN: M-80 Duplex Spline
RICE-BARTON: 4" Twin Spline
VAN NORMAN: 10CT Contour Miller, horizontal opposed spindle type for milling flat cams, also can be converted to similar work

SAWS & CUT-OFF MACHINES
RUSSELL: 9½" cut-off Saw with Auto. Stock Feed (New) Hydraulic
RUSSELL: 5½" dia. cut-off saws, auto stock feed, hydraulic (New)
MOTCH & MERRYWEATHER: No. 3 Circular Saw with auto. stock feed

THREAD MILLERS & TAPPERS
HALL PLANETARY: Model "D" Thread Miller
LANDIS: 2½" single head horiz. threading machine
LEES-BRADNER: #40A Thread Miller
LEES-BRADNER: CT-36 Thread Miller chucking type, 13½" hole
MURCHEY: #22 Horizontal threading and tapping machine, ½" to ⅛" dia. capacity, single spindle

MISCELLANEOUS
MOLDING MACHINES, ROLLER JOLT: Osborne Model 2047-3
OPTICAL PROFILE GRINDER: Wickman New
OPTICAL PROFILE GRINDER, Sheffield, used
AUTOMATIC SCREW MACHINE, Swiss type, ⅝"—used
AUTOMATIC SCREW MACHINE, Wickman, Single Spindle, 7/16" New
RACK CUTTING MACHINE: Sykes 12" to 36" length capacity (New)
CUT-OFF: Russell 5½ & 9½" cut-off saws with auto. stock feed (new) hydraulic
TEST STAND: Denison 918-AM Hyd.
HARDNESS TESTER: Grogan Brinell, 16-8
SHEFFIELD Precisionaire Gauge
SUNDSTRAND: Double-End, #53, 42" & 60" Centering Mach.
WIRE FORMING MACHINES: 4-slides (new)

TRIPLEX MACHINE TOOL CORP. ESTABLISHED 1919

75A West Street, New York 6, New York — **Cable Address TRIMACTOOL**

MODERN METAL STAMPING AND ASSEMBLY PLANT
CLEVELAND DISTRICT
Facilities Available to Produce from Raw Material to Packaged Product.
Prices Quoted from Blue Prints or Samples
CW-1550, AMERICAN MACHINIST
520 N. Michigan Avenue
Chicago 11, Ill.

WANTED
We are equipped to manufacture complete NITRALLOY STEEL PARTS.
Send your blue prints for prices.
CHOWNING REGULATOR CORP.
165 Cedar St., Corning, N. Y.

---

10 to 12 ft. Lengths
ALL METALS
Also special screw machine products to order
EASTERN MACHINE SCREW
20-40 Barclay St.
New Haven, Conn.
Makers of
H & G DIE HEADS

COPYING LATHE
Tracer Controlled Universal Toolroom 20"x60".
New 1952 in Perfect Condition—$9500.
FS-9913, AMERICAN MACHINIST
330 W. 42nd St., New York 36, N. Y.

PATTERNS in WOOD and METAL
For All Kinds of Castings, Large or Small
MATCH PLATE WORK A SPECIALTY
Put your pattern problems up to us — we will take care of them
GENERAL PATTERN WORKS
Cincinnati, Ohio

MACHINERY WANTED
AUTOMATIC THREAD GRINDER
Not less than 6 x 36 capacity. Must have automatic indexing and large wheel tracing device. Must be in good condition. State make and serial number.
W-1117, AMERICAN MACHINIST
330 W. 42nd St., New York 36, N. Y.

***If it's a* DEEP HOLE**
***Check with* HOLLOW BORING**
- **DEEP HOLE DRILLING**
- **HOLLOW BORED FORGINGS**
- **PRECISION HONING**

HOLLOW BORING CORPORATION
85 PRESCOTT STREET
WORCESTER, MASS.

GENERAL SERVICES ADMINISTRATION
250 Hudson Street New York 13, New York

Sealed bids on Invitation No. GS2-OS8D-(S)-2, will be received at this office until 10:00 A.M. March 24, 1954, and then opened for sale of the following: Approximately $654,000 of used and unused machine tools and equipment which have been screened against the known defense requirements of the Federal Government. Items offered for sale include compressors, motors, rheostats, pumps, drills, drilling machines, tapping machines, industrial gasoline engines, etc. Property located at General Services Administration Warehouse, Burlington, New Jersey. For bid forms and further information contact

GSA BUSINESS SERVICE CENTER
250 Hudson Street, New York 13, New York
Tel.: ALgonquin 5-4300, Ext. 84.

WANTED
1-8 stand-roll former
Shaft size—1½"
Horizontal Distance 12"
Vertical Distance—approx.—6 to 8"
Prefer—Yoder—Amco—Delstrum or Thisken
Call or write to
MAURICE FREEDMAN
32-34 Valentine St., Cambridge, Mass.

BUY FROM STOCK
Telephone
BAKER 5887

FALK
MACHINERY COMPANY

10 WARD ST.
ROCHESTER 5
N. Y.

Every Item Guaranteed as Represented

AUTOMATIC, #60G B & S High Speed, M.D.
AUTOMATIC, #0 B & S Wire Feed Screw, Late.
AUTOMATIC, Cleveland Model #B-1½" Sgl. Spdl.
AUTOMATIC, #2 B & S Wire Feed, 1" screw. Cap.
AUTOMATIC, #4 Brown & Sharpe, M.D. Tooling.

BALANCER, Anderson Bros. 14"x84", Rote-Checker.
BORING MILL, 24" Bullard New Era M.D. V.T.L.
BORING MILL, 36" Bullard M.D., V.T.L.
BORING MILL, 2½" Lucas Horiz. M.D.
BORING MILL, Lucas Horiz., 3" Bar, M.D.
BORING MILL, Giddings & L. #0 Horiz. 3¼" Bar.
BORING MILL, 100" Niles B-P M.D. 2 swivel hds.
BARRELS, Tumbling Lupamatic, Schutte & Koerting.
BRAKE, #335 Chicago, M.D., Press 6', #338.
BRAKE, #185 Chicago Power Apron, 8'3/16" cap.
BROACH, La Pointe 5 ton, 36" stroke, #1 Late.

CHIP WRINGER, 23" Barrett, M.D. with Hoist.
COMPRESSOR, Ingersoll Rand ER-1, 10 HP. M.D.
COMP., 15 HP, 10 HP, Gardner Denver, M.D., New.
COMPRESSOR, C-P 50 HP, M.D., 10x10, 278 CFM.
CRANE, GET Ricker 2 tons 11'9" span.
CRANE, Canton #8 Portable Gooseneck 3 ton cap.
CRANE, 6800 lbs. Cullen-Friestedt, Portable Gantry.

RADIAL DRILL, 3'9" Mueller, M.D.
RADIAL DRILL, 3'11" Canedy-Otto, M.D., Late.
RADIAL DRILL, 4'11" Cincinnati Bickford, M.D.
RADIAL DRILL, 4'x13" Cinc. Bickford Super Service.
RADIAL DRILL, 5'13" Cincinnati-Bickford, M.D.
RADIAL DRILL, 6'13" Cincinnati-Bickford, M.D.
RADIAL DRILL, 36" Walker Turner M.D., Late.
DRILL, Fosdick 16", S.S. Power Feed, M.D.
DRILL, #2 Colburn H.D. #4 M.T., M.D.
DRILL, #121 Baker Auto. S.S. Cam Operated.
DRILL, Deep Hole, Avey-Draudle #2 M.D.
DRILL, Edlund #2B, 3 spdle. #2 M.T., 16".
DRILL, 6 spindle Allen No. 2 M.T., Late Model.
DRILL, 6 Sp. Avey 12" overhang, #3 M.T., M.D.
DRILL, Cincinnati 21" with Tapping Attach. M.D.
DRILL, Natco Multiple Spdle C5, 10 Sp. M.D.
DRILL, Natco Multiple Spdle #12, #1 M.T., M.D.
DRILL PRESSES, Leland Gifford #1MS, 1, 2, 3, 4
DRILL PRESS, #2MS Buffalo Forge single spindle.
DRILL, Barnes, 24" S.S. #4 M.T., 1¼" cap.
DRILL PRESS, #25 Foote-Burt S.S. 24", #5 M.T.
DRILLS, #14, #15, #16, #18 Buffalo Forge, M.D.
FREEZE-FREEZ Motor Products 40 below zero.
DEMAGNITIZER, SB-911 Magnaflux, late type.

FACING HEADS, 20" & 24" Mummert-Dixon.
FILER, #11-S Cochrane Bly Auto Saw Filer.
FILER, Type P4 Oliver Fiber Type, M.D.
FURNACE, Westinghouse Elec. 18 KW. 2100°F cap.

GRINDER, 12"x36" Landis Univ. Cyl. Internal Attach.
GRINDER, #208 Besley 26" Discs M.D., Late
GRINDER, Sanford Surf. 8"x12" cap., New.
GRINDER, #1 Wilmarth Morman Hand Surf., 6"x12".
GRINDER, #2 Imperial Univ. Tool & Cutter, New.
GRINDER, #4 G & L Univ. Tool & Cutter, M.D.
GRINDER, Heald Rotary #25, M.D. 10" Cap.
GRINDER, Cylindrical, Norton 10"x24", M.D.
GRINDER, Brown & Sharpe #4 Univ. 12"x60".
GRINDER, Thread, Jones & Lamson #TG-615, Late.
GRINDER, Heald #72A-3 Internal Size-Matic.
GRINDER, 14"x36" Pratt & Whitney Vert. Surf.
GRINDER, Pratt & Whitney 22"x84" Vert. Surface.
GRINDER, Greenfield #12 Int. Hydromatic, M.D.
GRINDER, Oliver Auto. M.D. Drillpointer, #51.
GRINDER, Oliver Template Tool Bit M.D., Late
GRINDER, #33 Abrasive Vert. Auto. Surface, M.D.
GRINDER, #22 Heald Horiz. Rotary Surface, M.D.
GRINDER, Norton 6x18 Vert. Surface, Hyd. Late.
GRINDER, #60 & #70 Heald Internal.
GRINDER, 6"x18" Norton Hyd. Horiz. Surface, M.D.
GRINDER, Landis 6"x18" Cyl., M.D.
GRINDER, Sellers Type #1A Tool, 24" wheel.
GRINDER, 37" Wheel Dia. Osterheim Disc. 24" cap.
GEAR LAPPER, #3LS1, #13LS1 Fellows, Outboard Supports, Detachable Laphead, Late.
GEAR SHAPER, Fellows #6 High Speed, M.D.
GEAR SHAPER, Fellows #7 High Speed, M.D.

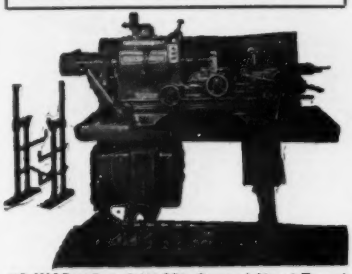
HAMMER, Rochester Hispeed, all sizes, M.D.
HAMMER, Bradley 200# Rubber Cushioned Helve.
HEADER, Manville #1 S.S.D.D. Cold 3/16".
INDUCTION HEATER, 10 KVA Ecco Hi Frequency.
INDUCTION HEATER, 30 KW Lepel, Late Type.
IRONWORKER, #½ Buffalo F. Univ. M.D., Coper, Notcher.

4DE POTTER & JOHNSTON Automatic Turret Lathe, Motor Driven, T.E.F.C. 7½ HP. 3/60.220/440.

IRONWORKER, #2½ Buffalo F. Univ. M.D. Notcher
AIR MOTOR HOIST, Ingersoll Rand 2000# cap.
ELECTRIC HOISTS, 500-4000 lbs. Whiting, NEW.
HONE, #194 Barnes Vertical, M.D., Hyd. Late.

KEYSEATER, #5 Davis M.D., NEW.
KEYSEATER, #5 Mitts & Merrill, Giant, M.D.
LAPPER, 2F Norton Vert., M.D., late type.

2—No. 7 BARDONS & OLIVER Geared Head
Full Universal Turret Lathe, Preselector Head. Bar Feed 2½" cap capacity through spindle. Late Type, Motor Driven with tooling.

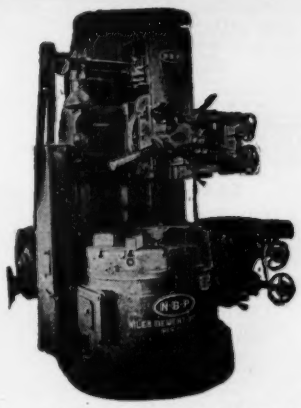


#2 WARNER & SWASEY Geared Head Turret Lathe, 12 Spindle Speed, Bar Feed.

LATHE, Le-Swing 8"x108", M.D., A.C. Rebuilt.
LATHE, Porter-Cable 9"x15" Geared Head Prod.
LATHE, #6 WSL Reid Smallpiece Prod., Late Type.
LATHE, LeBlond 14"x8' Q.C.G. M.D.
LATHE, Hendey 14"x8' Q.C.G., Taper Attach. M.D.
LATHE, American 16"x6' Q.C.G., Grd. Hd. M.D.
LATHE, Lehman 18"x7' Q.C.G., M.D.
LATHE, South Bend 18/26"x8' Gap Bed, Q.C.G. M.D.
LATHE, Reed-prentice 20"x10' Grd. Hd. M.D.
LATHE, 20"x16' Reed Prentice Grd. Hd., Late Type
LATHE, LeBlond 22"x10' Q.C.G., M.D.
LATHE, 24"x10' Axelson Grd., Late, M.D.
LATHE, 24"x12' Boye & Emmes Grd. Hd., T.A., Late
LATHE, Putnam 23/32"x12' Q.C.G., M.D.
LATHE, LeBlond 24"x14' Q.C.G., Grd Hd.
LATHE, 25"/50"x12' LeBlond Sliding Bed Gap, M.D.
LATHE, Lodge & Shipley 26"x14' Q.C.G., M.D.
LATHE, Bridgeford 27"x12' Geared Head, M.D.
LATHE, 27"x18' Niles Timesaver, Grd. Hd., M.D.
LATHE, Bridgeford 32"x16' Q.C.G., Grd. Hd.
LATHE, 42"x18' Pittsburgh Geared Head, M.D.
LATHE, Buffing Dble. End &VMTS, Devine Bros.
LATHE, Turret #1 Bardons & Oliver Electric Head.
LATHE, Turret #2 Simmons Vari Drive 220 V.
LATHE, Turret #2 W & S Univ. Grd. Hd., Late.
LATHE, Turret, #4 Warner & Swasey Univ. 1½".
LATHE, Turret #5 Warner & Swasey Univ. Late.
LATHE, Turret #6 Warner & Swasey Grd. Hd. Ram Type, Bar Feed. Motor in base.
LATHE, Turret #2 Cinci. Acme Univ. Geared Head.
LATHE, Turret #3A Warner & Swasey Univ. M.D.
LATHE, #60I Oster Hand Turret, M.D., Late Type.
LIFT TRUCKS, 1 & 2 ton, Platform & Fork.

MILL, No. 1 U.S. Hand, Late Type, M.D.
MILL, #1-14 Kent-Owens Hyd. Late Type.
MILL, No. 1½ Milwaukee Plain Horiz.
MILL, #2 Kempsmith Maximiller Horiz., Vert. Hd.
MILL, #06 Cinc. Vert. Prod. Rotary Table.
MILL, 2M Cincinnati Univ. Horiz. M.D.
MILL, #3B Brown & Sharpe Vertical, M.D.
MILL, #3B K & T Horiz., M.I.B.
MILL, #3B K & T Vert. M.D.
MILL, #3VB Hardinge Vert. Bench, M.D.
MILL, #4B Brown & Sharpe H.D., Horiz. M.D.
MILL, #14 Garvin Plain Horiz., M.D.
MILL, #0Y Brown & Sharpe Plain Horiz., M.D.
MILLING MACHINE, #2B K & T Horiz., M.D.
MILL, Cinci. Horiz. #3, #4, High Power, M.D.
MILL, #1 Brown & Sharpe Plain Horiz., M.D.
MILL, #0-8 Cinci. Vert. Prod. Late, M.D.
MULT-MILLER, U. S. Tool #MM-1-6 Auto. Prod.
MILL, No. 0 Brown & Sharpe Plain Horiz.
MILL, #0 Douglas Plain Horiz. M.D., Coolant.
MILL, #0 Vernon Hand Mill, M.D., Late.
MILL, #0-8 Cinc., Horiz. Rise & Fall, Late.
MILL, 2A Brown & Sharpe Horiz. Univ., M.D.
MILLING MACHINE, Kempsmith #2 Horiz. Univ.
MILL, #3 Cinc. Univ. Horiz., M.D.
MILLING MACHINE, LeBlond #4 Horiz. Univ.
MILL, #2 Vert. M.D. Brown & Sharpe.
MILL, #3 Cinci. Vertical Hi Power, M.D.
MILL, #5C Baker Vert. Die Sinker, M.D.
MILL, 42"x36"x12' Ingersoll Planer Type, 4 hds.
MILLING MACHINE, #2 Van Norman Duplex, M.D.
MOTOR GENERATOR SET, Gen Electric, 100 K.W.
NIBBLER, #136 Savage 36x3/16" Cap., M.D.

THREADING, Staybolt Lassiter Millholland 1½".
THREAD MILL, 7½x11 Hansen-Whitney, Univ.
THREAD MILL, 6x14 Pratt & Whitney No. 1105.
THREAD MILLER, Plan-O-Mill #3 Planetary Form & Thread Semi-Auatomatic Milling Machine, Late.



36" x 44" Niles Vertical Boring Mill, Side Head, Motor Driven.

42" Late Model KING Vertical Boring Mill. A.C. Motor Drive; 5 position turret head; Right Hand Side Head; 4 jaw Chuck table; Bijur System, Pendant control. New 1946. Excellent condition.

NAILING MACHINE, No. 16—48"-54" Morgan, Late.
PAPER SHREDDER, No. 10 Mitts & Merrill, M.D.
PLANER, Cincinnati 30"x36"x12' A.C., M.D.
POWER PRESS, Bliss #184 Open Back, M.D.
POWER PRESS, Bliss #3A S.S. Dble. Crank Grd. 45 tons, 4" stroke, 36"x20" Bed Area, M.D.
POWER PRESS—Bliss-Consolidated #183-B Straight Side Dble. Crank 45 tons, M.D.
PRESS, D72 & D673 Ferracute, Redraw, M.D.
PRESS, #2½ & #5 Toledo, OBI, Motor Driven.
PRESS, #3 Johnson OBI, 56 tons, new.
PRESS, #7 & #8 Johnson OBI 76 & 60 tons, New.
PRESS, #59¼ Toledo Str. Side, M.D., 440 tons cap.
PRESS, 70H & 125PA Drake Hyd. Arbor, New.
PRESS, #78½ Bliss tr. Side, 400 ton cap. M.D.
PRESS, Bliss #19, #20, #21, OBI, A.C., M.D.
PRESS, Waterbury-Farrel High Speed 60 tons #3W.
PRESS, 66 C Bliss Double Action, S crank.
PRESS, Lucas 15 tons Power Arbor, M.D.
PRESS, #68 Whitney Doog Thr. 24" foot.
PRESS, P2, P3 Ferrasute M.D. Reel feed.
WHEEL PRESS, 800 ton Niles-Bement-Pond, A.C.
PANTOGRAPH, #1A Gorton M.D. Engraving.
PUNCH, #48 Buffalo Forge Vert. Cap. 1"x1½" M.D.
PUNCH, R-4 Wiedemann Turret, 10 Stat. 24" thr.
PUNCH, Hasker Turret, 8 station, cap. 2½" hole.
PUNCH, H & J #2 Sgle. End. 24" Thr. 1" thru 1".

ROLLS, #1 Buffalo Forge Wrapping, M.D.
ROLLS, #1, #2 Buffalo Forge Vert. Angle Bending.
ROLLS, 72"x½" Lewn Initial M.D., New.
ROLLS, 72"x12 ga. Wysong & Miles, Initial Type

COLD SAW, Wagner 16"x16" cap., M.D.
COLD SAW, Espen-Lucas #700, 29" dia. blade, M.D.
CUT-OFF SAW, Radlee "J" DeSanno.
SAW, #8 Marvel Bandsaw, 18"x18" cap.
SAW, #4B Marvel Hack Saw 9"x8" Cap., M.D.
SAW, #20-C Racine Shear Cut 6"x6" cap., M.D.
SAW, 10"x10" Racine Hyd., Late Type, M.D., #30C.
SAW, Band Tannewitz GH-36" High Speed, M.D.
SAW, V-26 DeALL Bandsaw, Late.
SHAPER, 20" Gould & Eberhardt V-ways, Vise, M.D.
SHAPER, 16" Pratt & Whitney Crank, M.D.
SHAPER, 20" Roskford Univ. M.D., Tilting Table.
SHAPER, 24", 28" Gould & Eberhardt M.D.
SHAPER, 32" Cinci., D.C., Motor Driven, M.D.
SHAPER, Morton, 36" Draw-Cut, 4 speed M.D.
SHEAR, 10' x 10 ga. cap. Wysong & Miles, M.D.
SHEAR, 10' x ¼" cap. Wysong & Miles, M.D.
SHEAR, 6' x 14 ga. Parker M.D., Late Type.
SHEAR, #26 Buffalo Forge Slitting Armor Plate.
SHEAR, Quickwork #11 Rotary 60" Throat, 10 ga.
SCREW SLOTTER, #2 Waterbury Farrel Auto.
SLOTTER, 12" New Haven Vertical M.D.
SPOTTER & SCROPER, Anderson Power Unit, Late.
SPRU CUTTER, Milwaukee 50 tons, 2½ cap., M.D.
SURFACE PLATES & TABLES, all sizes.
TAPPER, #1 Cam Haskins, Motor Driven, Late.
TAPPER, #1 Bakewell (Warner & Swasey) Late.
THREAD ROLLER, #20, #30 Waterbury Farrel.
TRUCK, 4000 lbs. LT-44 Towmotor Fork, Lift 9'.
BRINELL TESTER, Type 63DR, Steel City.
WELDER, 600 amp. Westinghouse Flexarc A.C.
WELDER, 200 & 400 amps. Gen. Elec. Portable Arc.
WELDER, 75 KVA Federal M.D., Spot.
WIRE STITCHER, Morrison & Aems, M.D

OVER 1000 MACHINE TOOLS AVAILABLE IN STOCK

GOOD USED MACHINE TOOLS

AUTOMATICS

1¼" 6-spindle Conomatic, serial 1483CG.
1½" 6-spindle Conomatic, serial 2023WW.
2¼" 4-spindle Conomatic, serial 12554.
5/16" x 1¼" No. 00G Brown & Sharpe.
⅝" No. 0 Brown & Sharpe, (two)
1" No. 2 Brown & Sharpe
8" 6-spindle Bullard Mult-au-Matic
11" Model B Gosa & De Leeuw 5-spindle
14¾"x19" Fay Automatic, Flanders type
20"x29" Fay Automatic, serial 81539 & 81761, new 1942 (two)

DRILL PRESSES

24" No. 321 Baker heavy duty
No. 310 Baker heavy duty
Natco double end horizontal, 2 way
12 spindle No. 12 Natco multiple
22 spindle No. 14 Natco multiple
34 spindle No. A16 Natco multiple
30" swing Allen power feed sensitive
No. 36HO Baker vert. hyd. drilling & boring
No. 15½ Foote Burt hydraulic vertical
No. B250H Natco hydraulic vertical
3½' arm 8" column American sensitive radial
4' arm 13" column Carlton M1B radial, late
6' arm, 3' extension, 16" column American radials, late type (two)

GEAR HOBBERS

No. 3 & No. 12 Barber Colman
Type A Barber Colman universal
No. 12H Heavy Gould & Eberhardt universal
No. 36H Gould & Eberhardt
16" Cincinnati spur and spiral
8"-10" No. 1 Lees Bradner
No. 7S Lees Bradner
No. 3 Adams Farwell
72" S. & S. universal

GEAR MACHINERY MISC.

8" Red Ring Gear Shaver, two, late
8" Red Ring gear lapper
No. 60 Cross gear tooth rounder
Barnes "Mal" Hut O Lap gear lapper
National Cleveland gear checker
100"x24" Newark No. 7 spur gear cutter
10" Pratt & Whitney hydraulic gear grinder
Nos. 71A, 75A, 712 and 715 Fellows high speed gear shapers
Illinois gear measuring machine
No. 343 Sheffield gear chamferer

GRINDERS

No. 2 Cincinnati centerless, plain and Filmatic bearing
10"x18" Cincinnati Filmatic bearing
10"x18", 10"x36" & 16"x72" Norton cylindrical
12"x36" Cincinnati universal cylindrical, serial 1U-3D-1D-5
16"x96" Landis cylindrical
16"x96" Landis cap type cylindrical
No. 120A Gardner opposed spindle disc, 20"
23" No. 84 Gardner opposed spindle disc
53" No. 24A Gardner horizontal disc
72" No. 17S Gardner horizontal disc
30" No. 8 Badger double disc meter on spindle
No. 72A3 Heald plain hydraulic internal
No. 72A3 Heald Gagematic internal
No. 72A3 Heald Sizematic internal
No. 5 Bryant internal
5"x18" Norton vert. spindle hydraulic surface
8"x22" No. 3 Abrasive surface
12"x48" Model 300 Hanchett surface
No. 3 Barber Colman hob sharpener
10" Pratt & Whitney hydraulic gear

LATHES

14"x42" Hendey CamLoc, timken, toolroom
14"x18" Lipe HS Carbo-lathe, new 1943
17"x6' LeBlond Mfg. timken, (three)
48"x52"x20'6" Niles Bement Pond engine lathe, like new

MILLING MACHINES

No. 3 Sundstrand Rigidmill production
12" Cincinnati plain manufacturing, also 18"
24"x24"x12' Ingersoll adjustable rail planer type mill, mach., tracer controlled, new 1945
4—36 Cincinnati Hydromatic production
4—48 Cincinnati Hydromatic production
No. 2 Cincinnati high speed dial type plain
No. 1 Milwaukee vertical mill
No. 2B and 3K Milwaukee universal
No. 3B and 4K Kearney & Trecker plain

PRESSES

56 ton No. 304 Bliss, SS, solid frame, new 1942
60 ton No. 81 Cleveland, OBI (two)
88 ton No. 50-D-36 Cleveland, DC, steel frame
95 ton No. 7 Hamilton, OBI, steel frame (three) new 1947
126 ton No. 306 Bliss, SS, tiered frame
180 No. 94½ E Toledo, DC, tiered frame
500 ton No. 1042 Verson, SS, all steel, air clutch, late model
650 ton No. DA 8411 Hamilton SS, toggle drawing

SHAPERS

16" American
16" American Heavy pattern Auto-oiled
24" Cincinnati Climax heavy duty
26" Morton draw cut shaper
32" G & E shaper

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AUTOMATIC SCREW MACHINES

ACME-GRIDLEY Ra 6-spindle, 9/16" cap., late
CLEVELAND 3¾" model A, single spindle; late
GYROMATIC "Tavannes" #40, 6-spindle; late

BROACHES

CINCINNATI 1-30 Duplex Vertical, Hydraulic; late
COLONIAL VG-1-10-48 Vertical, Hydraulic; late
LAPOINTE 10-54 Vertical; cap. 20,000#; NEW 1947
OILGEAR 3XA Horizontal, Hydraulic; late

GEAR CUTTING EQUIPMENT

BROWN & SHARPE #6-72" Auto. Cutter; M.D.
CROSS #1, 40, 45 Gear Tooth Rounder; M.D.
DETROIT type GG-35 Gear Grinder; late
FELLOWS #61A, 6Z2, 75, 7A, 77, Late type
FELLOWS #48 H.S. Gear Shaper; Late
FELLOWS 13LS Lapper motor-drive; late
GLEASON 12" Straight Bevel Gen; late
GLEASON 3" spiral bevel gear gen; M.D.
GLEASON 24", 37" Bevel gear planers; M.D.
GLEASON #6 Revacycle, late type
GLEASON #13 Hypoid cutter sharpener; late
GLEASON #15 Spiral bevel Hypoid gear; late
GLEASON Model 17, Hypoid, Spiral; M.D. late
GOULD & EBERHARDT 12H Gear Hobber; late
GOULD & EBERHARDT 18H Gear Hobber; M.D.
GOULD & EBERHARDT #36BM 3-spindle auto. gear roughor; M.D.
GOULD & EBERHARDT 120-H M.D. Late Type
MICHIGAN Model 854 gear shaver, rack type; M.D.
MICHIGAN Gear Finisher, M.D., 862-24-A; late
PRATT & WHITNEY 10" Gear Grinder; late

LATHES, Turret

GISHOLT 1L Timken, M.D., late
GISHOLT 2L Timken, M.D., late
MOREY #2 & #4 ram type, Timken; late
WARNER & SWASEY Univ. Preselector No. 5, late

MILLING MACHINES—Thread

HALL style D Planetary; Late
LEES BRADNER Model HT, 12"x36" centers, late
MOREY 12"x30" & 12"x160" centers, late type

MILLING MACHINES—Plain

CINCINNATI 1-18 Automatic, Timken, late type
CINCINNATI #4, Dial type Timken; late type
KEARNEY & TRECKER Mod. 2HL; M.D.; late
KEARNEY & TRECKER Model 3CMS; PRT; late
KEARNEY & TRECKER 4H Plain, Timken late
ROCKFORD No. 3 Rigid Mill, Motor Drive
STARR No. 2 Table 13"x55", late type

MILLING MACHINES—Universal

CINCINNATI No. 3 Univ., dial type, Timken, M.D.
KEARNEY & TRECKER No. 3K—Late
RICHMOND No. 2 light type; late
VAN NORMAN #26 Ram Type Miller; late type

MILLING MACHINES—Vertical

CINCINNATI #3 Vertical; Timken; 1953
CINCINNATI 0-8 Vertical, Timken, late type
KEARNEY & TRECKER 3K Vertical, Timken, late
KEARNEY & TRECKER 3K Timken; Late
KEARNEY & TRECKER 4CH Timken; New 1953

PLANERS

BETTS (Consolidated) 100"x84"x44"; 3 hds; PRT Box Table; M.D.
DETRICK & HARVEY 48"x48"x16'; 4 hds; hydr M.D.
GRAY 24"x24"x6'; motor drive
GRAY 36"x36"x10' "Maximum-Service" 4 hds; PRT; DC reversing M.D.
GRAY 48"x48"x10' "Maximum Service" 4 hds; PRT; DC reversing M.D.
LIBERTY 144"x76"x48" adj. openside; box table; 4 hds; vari-voltage; PRT; Late M.D.
NILES 48"x48"x12' "Time Saver" 3 hds DC reversing; PRT; M.D.; Late type
NILES 108"x84"x42'; 4 hds; PRT; box table; DC; M.D.
NILES BEMENT POND 72"x72"x30'; 4 hds; PRT; DC; M.D.

GRINDERS—Internal

BRYANT No. 3 and 5 Internal; hydraulic; late
BRYANT No. 16-C-16 Internal; hydraulic; late
BRYANT No. 24 Internal; hydraulic; late
CHURCHILL No. 3 Internal; 8" stroke; late
HEALD No. 70A Internal, M.D., late
HEALD No. 81 pl. chuck type, internal; M.D.
HEALD No. 72A5 Plain; late type
HEALD No. 72A5 "Gagematic" Internal; late
HEALD No. 78 Internal, centerless, M.D.

GRINDERS—Cylindrical, Plain & Universal

BROWN & SHARPE No. 3 Universal; late type
BROWN & SHARPE No. 5, 3"x12"; Plain; late
CINCINNATI 10x48" Plain
LANDIS 10x48" Plain
LANDIS 10"x18" type "C" Plain; hydraulic; late
NORTON 4"x12" model CTU Plain; year 1953
NORTON 6"x18" Type "C" Plunge; late
NORTON 10"x48" Type "C" Hyd. Pl. Cyl.; late
VAN NORMAN No. 606, 48" centers, crankshaft; late

GRINDERS, Surface

ABRASIVE No. 34, 8"x24" table; late type
ARTER 8" Rotary, motor drive
BILLITER & KLUNTZ 48"x196" Way Grinder; M.D.
HEALD No. 22 Rotary, 12" chuck; M.D., late

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AUTOMATICS

1-1/16" Cleveland Model A (1942).

BORING MACHINES

No. DB2112 Excello Single End Borer
100" Niles-B-Pond Vert. Bor. Mill.

DRILLS

No. 2 Avey Cam Fd. Drill. 14" Swing.
2 Spdl.—24" SW.—No. 3 Avey
D-31 Fox Multiple.
No. 57H Fox 24 Spindle Multiple Drill (1943)

GEAR MACHINES

11" Gleason Gear Generator.
No. 12HS Gould & Eberhardt.
No. 36-BM G. & E.—3 spdl. Rougher.
615-A Fellows Gear Shaper.
612-A Fellows Gear Shaper.
No. 64 Fellows Gear Shaper.

GRINDERS

6"x18" Landis Type C (1942).
6"x18" Norton Type C Plain (1943).
10"x36" Norton Type C Grinder.
10"x36" Norton Type C cam Grinder.
No. 1109 Bryant Internal Gdr. (1951).
No. 5 Bryant Internal Grinder.
No. 5B Bryant Internal Grdr.
No. 16-16 Bryant Int. Grinder.
No. 16A-16 Bryant Internal Grinder.
No. 16-28 Bryant Int. Grinder.
No. 16 A-28 Bryant Internal Grinder.
No. 24-26 Bryant Int. Grinder.
No. 24-36 Bryant Internal Grinder.
No. 81 Heald Internal Centerless.

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10"x36" Centers. 14"x36" Centers.
10"x72" Centers. 14"x50" Centers.
10"x96" Centers. 14"x72" Centers.
18"x96" Centers. 14"x96" Centers.
18"-30" gap x 96" Centers.
24"x264" Centers.

HONES

Model H-2 Micromatic Horiz. Hone.
Model 200-H5-Dbl. End Micro. Horiz.
Model H-7 Micromatic Vert. Hone

LATHES

8"x15" Automatic Lathe.
R-14 Lo-Swing Automatic Lathe.
18"x6' Am. Geared Head Lathe.
18"x8' Lodge & Shipley Grd. Hd.
27"x12' American Geared Hd. Lathe.
27"x12' centers LeBlond Lathe.
36"x18' Putnam Grd. Hd. M.D.
No. 5W Acme Tur. Lathe (Late).
No. 3AL Gisholt, Cross-Slide Turret.
No. 4A Warney & Swasey Turret.
No. 6 Warner & Swasey, cone head, Turret.
2¼"x24" Jones & Lamson, turret.
18" Libby, M. D., turret.
No. 4A Warner & Swasey (1944).
No. 4A Warner & Swasey, Taper, Cross-sliding Turret (1942).

PLANERS

48"x36"x14' Gray, 2 Heads.
48"x48"x12' Cincinnati, 2 Heads.
60"x48"x27' American, 4 Heads.

MILLING MACHINES

54" Ingersoll Vertical Adjustable Rotary Mill.
No. 08 Cincinnati Vert. (1942).
No. 12 Cincinnati Pl. Auto.
4" Taylor & Fenn Duplex Spline.
6"x168" Pratt & Whitney Thrd. Mill.
10"x48" Hanson-Whitney Thrd. Mill.
10"x60" Pratt & Whitney Thrd. Mill.
12"x102" Mod. HT Lees Bradner Thrd. Mill.
54"x30"x16' Ingersoll Slab Mill.
No. 34-36 Cincinnati Hydro.

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#1 LeBlond Universal Tool & Cutter, m.d.
#2 LeBlond Tool & Cutter, m.d.
Gisholt Universal Tool Grinder, belt
Type 05D Sellers Drill Grinder, m.d.
No. 0-2 GF Sellers Drill Point Thinning Machine, m.d.
Grand Rapids Tap Grinder, style 12M
Gleason Cutter, belt drive
No. 2A Wm. Sellers Universal Tool Grinder, m.d.
No. 2B Sellers Wet Grinder, m.d.
No. 2 Lumsden Oscillating Tool Grinder, belted m.d.
No. 4T Sellers Tool, m.d., latest
No. 5T Sellers Tool, m.d.
No. 1 J & B Tap Grinder, m.d.
Pratt & Whitney Deep Hole Drill Sharpener, m.d., latest
Gould & Eberhardt Gear Cutter Grinder, 2 step cone pulley belt drive
Oliver Ace Universal Tool & Cutter Grinder, m.d.

ENGINE LATHES

Gema "Copytor" Hydraulic Duplicating Attachment, m.d.
Model TR 30 Hardinge High Speed Precision Lathe, m.d.
12"x6' Lodge & Shipley Geared Head, m.d., taper
13"x54" centers LeBlond Geared Head, m.d., taper
14"x61½" centers American Geared Head, m.d.
14"x30" centers Bradford Lathe, Timken
14"x6' American High Duty Geared Head, m.d., taper
14"x6' Hendey Geared Head, m.d., taper
14"x6' Lodge & Shipley Geared Head, m.d.
14"x6' Lodge & Shipley, cone, motorized
14"x6' Pratt & Whitney, cone
14"x6' LeBlond, cone
14"x6' LeBlond Geared Head, s.p.d.
14"x6' bed Monarch, cone, motorized
14"x6' Sidney Geared Head, m.d.
14"x6' Springfield Geared Head, m.d., taper
14"x8' Sidney Geared Head, m.d.
14"x8' Prentice, m.d., taper
16"x30' centers Monarch, m.d., taper
16"x6' bed Cisco Geared Head, m.d.
16"x6' Hendey Geared Head, m.d.
16"x6' Hendey Yoke Head, taper
16"x6' Lehmann Geared Head, m.d.
16"x6' Lodge & Shipley Selective Head, m.d.
16"x6' bed Monarch Geared Head, m.d.
16"x8' Monarch, cone, motorized
16"x12' bed Boye & Emmes, cone, motorized, taper
16"x12' bed LeBlond Geared Head, m.d., taper
16"x14' Monarch, m.d., taper
17"x6' LeBlond Geared Head, m.d.
18"x5' LeBlond Geared Head, m.d.
18"x6'6" bed Greaves-Klusman Geared Head, m.d.
18"x7' Hendey Geared Head, m.d., taper
18"x8' bed American Geared Head, m.d.
18"x8' Hendey Geared Head, m.d., taper
18"x8' Lodge & Shipley Geared Head, m.d.
18"x8' Whitcomb-Blaisdell Geared Head, s.p.d.
18"x8'6" bed Walcott, cone, motorized
18"x10'6" bed Boye & Emmes, cone motorized
18 27x8' Nebel Removable Block Gap Series LN, Geared Head, m.d.
19"x4' centers LeBlond, m.d.
19"x6' bed LeBlond Geared Head, m.d., later type
19"x10' bed LeBlond H.D., m.d.
19"-38"x10' bed LeBlond Gap Lathe, cone, motorized, taper
20"x8' bed American Geared Head, m.d., taper
20"x8' Cisco, cone, motorized
20"x8' bed Greaves-Klusman Geared Head, m.d. in leg
20"x8' bed Boye & Emmes, m.d.
20"x8' bed Lodge & Shipley Geared Head, m.d., taper, later type
20"x10' bed Hamilton, cone, motorized
20"x10' bed (6' centers) Sidney Geared Head, m.d., taper
20"-40"x9' bed Rahn-Larmon Gap Lathe, cone, motorized
20"x10'6" Boye & Emmes, cone, motorized
20"x10'6" bed Sidney "Tritrol" Geared Head, m.d., late
21"x8' bed LeBlond Geared Head, m.d., taper
24"x7' centers American, m.d.
25"x10' bed LeBlond Geared Head, m.d., taper
24"x12' LeBlond Geared Head, m.d., taper
23"x12' bed LeBlond, cone, motorized
24"x12' bed Boye & Emmes, belt drive
24"x12' Bridgeford Geared Head, m.d., taper
24"x6' bed Lodge & Shipley, cone, motorized, taper
24" raised to swing 32"x22' bed—16' centers New Haven, cone, taper
30"x10' Betts-Bridgeford, m.d.
30"x12'6" bed Niles-Bement-Pond, variable speed m.d., taper
30"x40' bed (33' centers) Betts-Bridgeford Heavy Duty Hollow Spindle, "Oil Country" type, m.d.
30"x13'6" bed Niles-Bement-Pond, m.d.
36"x84" centers American "Super-Productive," m.d.
36"x16'6" bed Boye & Emmes Geared Head, m.d.
36"x18' Putnam, m.d.
40" raised to 48½"x120" centers LeBlond, m.d.
42"x14' bed American Geared Head, m.d.
42" Putnam raised to swing 56½"x20' bed Geared Head, m.d., 11'6" centers
42"x180" American Super-Productive Lathe, m.d., taper
48"x20'6" bed Niles-Bement-Pond, m.d.
48"x33' centers Niles-Bement-Pond, m.d.
63"x7' centers I. H. Johnson, m.d.
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Norton 12" x 36" Hydraulic—Internal spindle —MD—Late type

Brown and Sharpe No. 1 and No. 2—Late types

LATHES

American 36" x 13' centers Geared Head—12 speeds 9 to 400 RPM—MD

Hendey 4C-54 and 4C-66 Heavy Duty Geared Head Mfg. Type—Flange type MD—Coolant —Late type

Lodge and Shipley 24" x 14' Geared Head—Taper attachment—MD

Pratt and Whitney 16" x 36" Model B—Motor in base—Geared head—8 spindle speeds

Pratt and Whitney 12" x 100" Model B—Motor in base—Attachments

MILLERS

Cincinnati 72"x54"x16' Hypro Planer Mill—Infinitely variable speeds—2 rail and 2 side heads—MD

Cincinnati No. 4 Plain—Rectangular overarm—Timken bearings—No. 50 taper—Power rapid traverse—MD—Vertical head

Cincinnati No. 4 Vertical Dial Type—Range 42" x 16" x 16"—Table 16¼" x 78½"—No. 50 taper—MD—Late type

BORING MILL—HORIZONTAL

Universal No. 24 Tri-way—3" bar—Table 26" x 52"—MD

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16"x78" centers PRATT & WHITNEY Model "C" Toolroom Lathe, taper attachment, chucks, new 1943

28"x15' centers BERTRAM (Niles patterns) "Timesaver" Engine Lathe, 2 carriages, rapid traverse, AC-MD, new 1943

36"x12' centers AMERICAN Heavy Duty 16 Speed Geared Head Lathe, AC-MD

60"x20' NILES-BEMENT-POND Geared Head Engine Lathe, rapid traverse

No. 1L GISHOLT Saddle Type Universal Turret Lathe, preselector head, bar feed, chuck, new 1943

No. 1A WARNER & SWASEY Universal Turret Lathe, Timken spindle, electric chuck

No. 2A WARNER & SWASEY Universal Turret Lathe, preselector head, bar feed, chuck, new 1943

No. 3A WARNER & SWASEY Turret Lathe, Timken spindle, electric chuck, tooling

No. 2 VAN NORMAN Plain Horizontal Mill, New 1943

No. 3-24 CINCINNATI Plain Hydromatic Mill, AC-MD

No. 4 KEARNEY & TRECKER Plain Horizontal Mill, No. 50 taper, motor in base, rapid traverse

No. 4 CINCINNATI High Speed Dial Type Plain Horizontal Mill, new 1942

No. 4 CINCINNATI High Power Dial Type Vertical Mill, 25 HP motor, new 1951

48"x48"x10' NILES Double Housing Planer, box table, DC reversing motor drive.

48"x48"x12' Cincinnati Double Housing Planer, power rapid traverse, DC reversing motor drive, box table, forced feed lubrication.

48" widened to 68"x12' DETRICK & HARVEY Double Housing Planer, box table, DC reversing motor drive

No. 2 BROWN & SHARPE Surface Grinder, motor inside base, power feeds

25A Heald Rotary Surface Grinder, 24" diameter magnetic chuck, AC-MD

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30" MORTON Hydraulic Keyseater, new 1942

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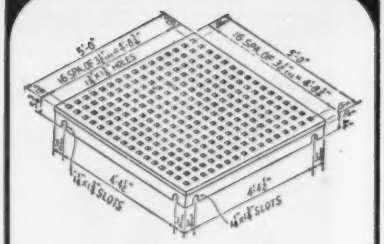

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4'11" Bickford, Motor Drive
4'9" Morris Mor-Speed, 1943
27" Arboga (Swedish) New

MILLING MACHINES

5-48 Cinci. Hydromatic, 1942
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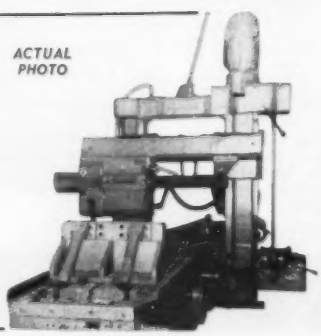

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18"-20" SWING, 60" CENTERS

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Brown & Sharpe (4) Model 00G, ⅜" capacity.
Ceco Screw Machine ⅜" capacity.
Cleveland Model AA-11, Serial #36586.
Cleveland Model B, Serial #42618/843.
Cleveland B18—1½" Cap. Late.
Conomatic 4 Spindle, Serial #2309FF, 1½".

BORING MILLS
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Bausch Multi-spindle
Buffalo #2 Motor Spindle, #16—4 Sp.
Buffalo: Power No. 41, No. 42 RPMSTERS
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Cincinnati Bickford 6'15" col.
Edlund 8" Model 2B, Sliding Head
Natco #12, 20 spindle, Model B2A—10 Sp.
24" Sibley Sliding head
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Foote-Burt #25 3" capacity
Leland-Gifford 2 LMS, 3 MS
Leland Gifford No. 2—4 Sp. Hyd. Feeds
Sigourney 2 spindle

ENGRAVERS
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Preiss UAM
Taylor-Hobson 3 dimensional Pantograph
New, 3 dimensional Deckel type

GEAR EQUIPMENT
Barber-Colman Mod. SHS, Sharpener
Barber-Colman #3, #2, #12 (3) also Type S.
Brown & Sharpe #3 Gear Mill, 26" Cap.
Fellows High Speed Shapers 712, 725, 71, 7, 61A
Fellows #20M Redliner, Flather 72" Cutter
Gleason Gear Rougher, Gleason #6 Power Tester
Gleason #2 Surface Hardener, No. 3 Gear Tester
Gleason #3 Spiral, #3 Straight Bevel
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National Broach Red Ring Lapper, Finisher
Schuchardt & Shutte #1 Hobber

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Brown & Sharpe #5, #2 with Chuck
Gallmeyer & Livingston—65
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Cincinnati 6x18" Hyd. #4—Centerless—#2
Douglas Tool & Cutter 8"x15"
Gardner Disc Grinder 30"—15 H.P. Motor
Grenby Models 1G1 & 1G2—Internal
Gorton Ped. Type Tool Grinder Mod. 375-2
Heald #73 Internal Centerless, #75A Internal
Heald 72A3 Int. Centerless Sizematic
J. & L. Thread; TG615, Lempco 54" Swing
Landis 6"x30" Type C Cyl., 10x24 Univ. 12x30
Norton #2 Tool & Cutter, No. 1 Tool & Cutter
Norton Type C 6"x18" Semi-Automatic cyl.
Norton 10"x18" Type C cylindrical, 6"x30" Cyl.
Norton 14"x96" cyl. 16x48 Univ.
Norton Roll Grinder 50"x28'
Oliver #510 Drill Pointer
Pratt & Whitney Radius Model R6
Sellers 6-G Drill Grinder, 6G Tool, K.O. Lee tool
Van Norman #666 Crankshaft

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Gisholt Simplimatic 18"x16½", 2 Tables
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Kent Owens IV, 1-8, 1-14, 1M, 2-20
Kempsmith #1 Pl., Vert. & Div. Hd.
Milwaukee 2H Universal, 2H Plain
Milwaukee #2B, Plain & Univ.
Sundstrand #00, 0, Rigidmils
Sundstrand #3A Rigidmil with copying Attach, 33
Van Norman #2L Univ., Dividing Head, Mod. 1-18
(8) Van Normans #12—Hor/vert—Late

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Cincinnati #3, 08 Vertical
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INDEX OF PRODUCTS ADVERTISED IN THIS ISSUE

Abrasives, Coated 173, 176-177

Accessories & Attachments (Machine Tool) 72, 186, 210, 216, 223, 234

Balancing Machines 53

Bearings 196

Bending Machines 186, 217

Books, Technical 216

Boring, Drilling & Milling Machines (Horizontal) ..... 3rd Cover, 14-15, 82, 239

Boring Machines Internal ..... 2nd Cover

Boring & Turning Machines (Vertical) ..... 14-15, Insert Bet. 32A-32D, 239

Brushes 210

Centering Machines 224

Chucks 200, 235, 237

Cleaning & Drying Machines & Supplies 180

Collets 49, 235

Counters 24

Coolant Systems, Filters & Supplies 161

Cut-Off Machines 222

Diamond Wheels 176-177

Die Sets 164

Dressers 234

Drilling Machines ..... 3rd Cover, 22-23, 40-41, 58-59, 64, 73, 155, 169, 214, 220, 224

Drill Jig Bushings 82

Duplicators & Pantographs 96, 213

Fabricating Methods & Services 210

Fasteners 44, 181

Floor Drying Compounds 170, 182

Gages & Instruments 16, 37, 54-55, 78-79, 94, 163, 165, 188, 190, 198, 212, 215, 218, 220, 222, 224, 239

Gear Cutting Machines ..... 3, 6-7, Insert Bet. 48-49, 86, 208

Gears, Speed Reducer, Motor Reducers ..... Insert Bet. 48-49, 167, 200, 208, 214, Insert Facing 216

Gear Testers ..... 3, 6-7, Insert Bet. 48-49

Grinders—Cutter & Tool 12-13, 45, 77, 236

Grinding Machines—Production 12-13, 18-19, 38, 45, 63, 192-193

Grinding Wheels ..... 18-19, 26-27, 30-31, Insert Bet. 152-153, 192-193

Heads: Drilling, Grinding & Tapping 84, 199, 224, 239

Heat Treating Equipment & Supplies 171, 216, 237

Honing Machines 47, 132, 220

Hydraulic & Pneumatic Parts & Equipment 33, 93, 153, 159, 203

Jig Borers 204-205, 235

Lapping Machines 18-19, 38

Lathes, Automatic 42-43, 53

Lathes, Engine 22-23, 25, 50-51, 69, 174, 185, 191, 207, 214

Lathes, Speed 220

Lathes, Turret 22-23, 53, 62, 70, 223

Lubricants, Cutting Fluids, Quenching Oils & Solvents 20-21, 71, 90, 187, 211

Machines, Super Finishing 53

Marking Machines, Tools & Supplies 76, 220

Materials, Cutting & Forming ..... 4th Cover, 32A, 48, 56-57, 65, 168, 174, 197, 238

Materials of Manufacture 132, 240

Materials Handling Equipment 202

Millers, Die Sinkers, Profilers 4-5, 8-9, 34, 46, 75, 157, 175, 213

Motors, Electrical 195

Oil Purifiers 209

Planers 14-15, 28-29

Polishing & Buffing Machines 220

Power Transmission 17, 184

Presses, Forging & Forming Equipment & Supplies ..... 32, 39, 61, 66-67, 68, 80, 130, 134, 189, 210, 216, Insert Facing 217, 219, 222

Pumps, Circulating 212

Riveting Machines 93, 166, 236

Safety & Welfare Equipment 224

Saw Blades 60, 78-79, 206, 222

Sawing Machines 60, 218, 223, 224

Screw Machines; Chucking Machines 22-23, 36, 88-89, 172, 203, 221

Shapers, Slotters, Keyseaters 96, 222

Special Machine Tools 42-43, 53, 64, 75, 129, 169, 183

Steel Blue 223

Tapping Attachments 178-179

Tapping Machines 22-23, 159, 178-179

Thread Cutting Machines 10-11

Tools, Cutting ..... 32D, 35, 52, 74, 168, 178-179, Insert Facing 184, 194, 220, 224, 234

Tools, Hand 162

Tools, Measuring 78-79, 212

Tools, Portable 201

Transportation 184B

Used & Surplus Equipment 226-232

Vises 186

Welding & Cutting, Brazing & Soldering Equipment & Supplies ..... Insert Bet. 64-65

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INDEX TO ADVERTISERS

This index is published as a convenience to the readers. Every care is taken to make it accurate, but AMERICAN MACHINIST assumes no responsibility for errors or omissions.

	Page
Acme Gear Company	208
Acme Scientific Company	224
Acromark Company	220
Affiliated Machine & Tool Co.	224
Allegheny-Ludlum Steel Corp.	32A
Alvord-Polk Tool Co.	220
American Chain & Cable Co., Inc.	163
American Gear & Mfg. Co.	167
American Sip Corporation	204-205
American Steel Foundries, Elmes Engineering Div.	61
American Tool Works	25
Ames Company, B. C.	198
Apex Tool & Cutter Co. Inc.	224
Armco Steel Corporation	136
Armstrong-Blum Mfg. Co.	60
Armstrong Bros. Tool Co.	72
Attapulous Minerals & Chemicals Corp.	170
Austin Industrial Corp.	46
Automotive Gear Works Inc.	Insert Facing 216
Barber-Colman Company	52
Bardons & Olivers Inc.	70
Bay State Abrasive Products Co.	176-177
Black & Decker Mfg. Co.	201
Black & Webster Inc.	222
Black Diamond Saw & Machine Works Inc.	216
Blanchard Machine Co.	63
Braun Gear Co.	208
Brush Electronics Company	215
Bryant Chucking Grinder Co.	88-89, 212
Bryant Machinery & Engineering Co.	58-59
Buck Tool Company	200
Bullard Co.	Insert Bet. 32A-32D
Carborundum Company	Insert Bet. 152-153
Card Mfg. Co., S. W.	35
Cardinal Machine Co.	186
Carpenter Steel Company	223
Century Electric Company	195

INDEX TO ADVERTISERS

	Page
Chicago Pneumatic Tool Co.	203
Cincinnati-Bickford Tool Co.	73
Cincinnati Gear Co.	200
Cincinnati Gilbert Machine Tool Co.	3rd Cover
Cincinnati Milling Machine Co.	4-5
Cincinnati Milling Machine Co. Grinding Wheels Division	26-27
Cincinnati Milling Machine Co. Hydroform Division	39
Cincinnati Planer Company	14-15
Cincinnati Shaper Company	96
Cities Service Oil Co.	71
Cleereman Machine Tool Co.	58-59
Cleveland Punch & Shear Works Company	219
Columbia Tool Steel Company	174
Columbus Die-Tool & Machine Co.	210
Covel Manufacturing Company	45
Cross Company	129
Crucible Steel Co. of America	48, 65
Curtis Pneumatic Machinery Div. Curtis Mfg. Co.	33
Dake Engine Co. Insert Facing	217
Danly Machine Specialties Inc.	80
Davis & Thompson Co.	239
Davis Keyseater Company	222
DeLaval Separator Company	209
Delta Power Tool Div. Rockwell Mfg. Co. Drill Head Unit	155
Derbyshire, F. W., Inc.	214
Desmond-Stephan Mfg. Co.	234
Detroit Die Set Corp.	164
Drillunit Inc.	214
Dykem Co.	223
Eagle Picher Sales Co.	182
Eastern Machine Screw Corp.	224
Eastman Kodak Co. Special Products Sales Div.	165
Edlund Machinery Company	222
Elmes Engineering Div. American Steel Foundries	61
Ex-Cell-O Corporation	82
Federal Products Corp.	54-55
Fellows Gear Shaper Company	6-7

(*Continued on page* 236)

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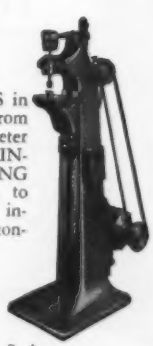

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INDEX TO ADVERTISERS

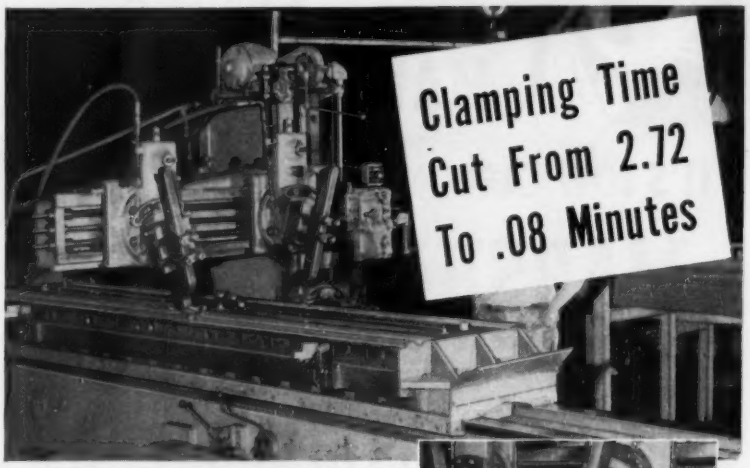
(*Continued from page* 235)

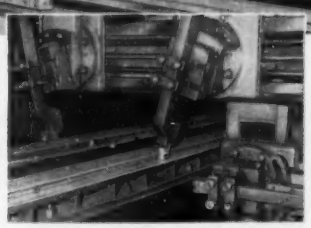
	Page
Foote Gear Works, Brad	167
Fosdick Machine Tool Company	40-41
Frauenthal Div. Kaydon Eng. Corp.	192-193
Giddings & Lewis Machine Tool Co.	14-15
Gisholt Machine Company	53
Gleason Works	3
Goss & DeLeeuw Machine Company	172
Grant Mfg. & Machine Company	236
Gray Co., G. A.	28-29
Greenfield Tap & Die Corp. Insert Facing	184
Greenlee Brothers	183
Grob Brothers	224
Hamilton Tool Company	86
Hannifin Corp.	153
Hardinge Brothers, Inc.	49
Hartford Special Machinery Co.	169
Haynes Stellite Co., Div. Union Carbide & Carbon Co.	32D
Heald Machine Company	2nd Cover
Hebert Equipment Company	224
Hendey Machine Co. Inc.	207
Hones, Inc., Charles A.	237
Jarvis Co., Charles L.	178-179
Johnson & Bassett Inc.	213
Jones & Lamson Machine Co.	37, 62
Kearney & Trecker Corp.	75
Keller Tool Company	166
Kennametal Inc.	168
Kent-Owens Machine Company	157
King, Andrew	218
Knight Machinery Co., W. B.	175
Lake Erie Engineering Corp.	66-67
Lamina Dies & Tools Inc.	216
Landis Machine Company	10-11
Landis Tool Company	12-13
Lavallee & Ide Inc.	74
LeBlond Machine Tool Co., R. K.	50-51

INDEX TO ADVERTISERS

	Page
Leland-Gifford Company	224
Lincoln Park Industries Inc.	188
Link-Belt Company	17
Linley Brothers Co.	235
Lodge & Shipley Company	69
Logansport Machine Company	159
Luers, J. Milton	223
Marshall Steel Company	238
Massachusetts Gear & Tool Co.	214
M.B.I. Export & Import Ltd.	235
McGraw Hill Book Co., Inc.	216
Michigan Tool Company	Insert Bet. 48-49
Micromatic Hone Corp.	47
Millers Falls Company	206
Minnesota Mining & Mfg. Co.	173
Moline Tool Company	220
Morey Machinery Co., Inc.	223
Morris Machine Tool Co.	64
National Acme Company	36
Nebel Machine Tool Company	174
Nelco Tool Company	194
Nicholson File Company	162
Nichols-Morris Corp.	34
Noble & Westbrook Mfg. Co.	76
Norgren Co., C. A.	161
Norton Company	18-19, 30-31
Oakite Products Inc.	180
Oliver Instrument Company	77
O'Neil-Irwin Mfg. Co.	186
Pittsburgh Gear Company	167
Pittsburgh Plate Glass Co. Brush Div.	210
Railway Express, Air Express Div.	184B
Randall Co., Inc., Frank E.	220
Reeves Pulley Co.	184
Ruthman Machinery Company	212

(Continued on page 238)





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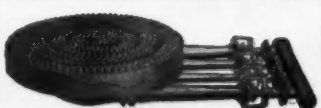

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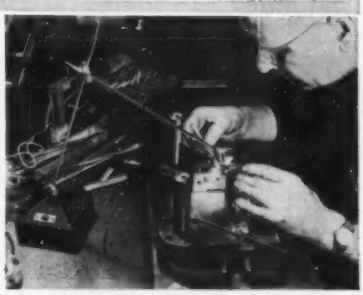

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INDEX TO ADVERTISERS

(*Continued from page 237*)

	Page
S.K.F. Industries Inc.	196
Sales Service Machine Tool Co.	222
Schauer Mfg. Corp.	220
Scherr Co., Inc., George	208, 234, 239
Sheffield Corp.	84, 94
Sheldon Machine Company	185
Shore Instrument & Mfg. Co. Inc.	222
Smith Corporation, A. O.,	Insert Bet. 184-185
Socony Vacuum Oil Co., Inc.	187
South Bend Lathe Works	191
Speedi-Dri Corp.	170
Standard Electrical Tool Co.	236
Standard Oil Co. (Indiana)	20-21
Standard Pressed Steel Co.	44
Starrett Co., L. S. The	78-79
Stuart Oil Co., Ltd. D. A.	211
Sturtevant Co., P. A.	212
Sundstrand Machine Tool Co.	42-43
Sundstrand Magnetic Products Co.	237
Sunnen Products Company	132
Surface Combustion Corp.	171
Taft-Peirce Mfg. Co.	38
Tannewitz Works	218
Texas Co.	90
Timkin Roller Bearing Company Steel & Tube Div.	4th Cover
Tomkins-Johnson Company	93
Townmotor Corp.	202
Union Carbide & Carbon Corp.	32D
United States Drill Head Co.	199
U. S. Tool Co., Inc.	68
V & O Press Co. Div. Emhart Mfg. Co.	32
Vanadium Alloys Steel Co.	197
Van Keuren Co.	16
Van Norman Company	8-9
Veeder-Root Inc.	24
Verson Allsteel Press Co.	130
Wade Tool Company	221
Waldes Koh-I-Noor Inc.	181

INDEX TO ADVERTISERS

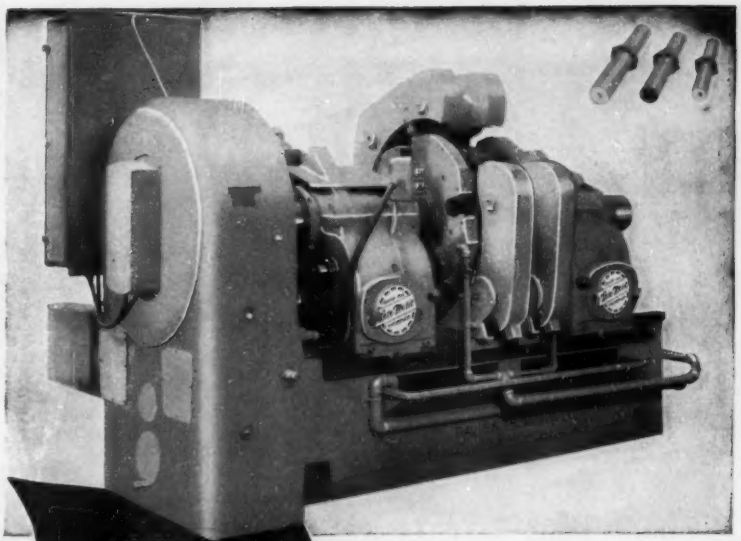
	Page
Waltham Machine Works	208
Warner & Swasey Company	22-23
Webber Gage Company	190
Wesson Co. & Affiliates	56-57
Wiedemann Machine Co.	134
Williams White & Company	217
Wilson Co., K. R.	189
Wilson Mechanical Instrument Co.	163
Wysong & Miles Company	222
Youngstown Sheet & Tube Co.	240

SEARCHLIGHT SECTION
(Classified Advertising)

EMPLOYMENT	Page
Positions Vacant	225
Selling Opportunities Offered	225
Positions Wanted	225
Selling Opportunities Wanted	225
Employment Agencies	225
Employment Services	225
SPECIAL SERVICES	
Contract Work	226
Chowning Regulator Corporation	226
Eastern Machine Screw Corp.	226
General Pattern Works	226
Hollow Boring Corporation	226
EQUIPMENT (Used or Surplus New) For Sale	226-232
WANTED Equipment	226

ADVERTISERS INDEX

Aaron Machinery Co., Inc.	231
Acorn Iron & Supply Co.	230
Bennett Machinery Co.	230, 232
Botwinik Bros. of Mass.	230
Brownell Machine Tools Inc., Hazard	231
Currier Machine Sales	232
Dony Machinery Co.	231
Eastern Machinery Co.	229
Electric Equipment Co.	226
Falk Machinery Co.	227
Freedman, Maurice	226
General Service Administration	226
Hill-Clarke Machinery Co.	228
Indianapolis Machinery & Supply Co.	232
Johnson Machy. Co.	232
Machinery Rentals Inc.	232
McDonald Machinery Co.	232
Miles Machinery Co.	228, 230
M & N Hydraulic Press Co.	232
Morey Machinery Co., Inc.	228
National Machinery Exchange	232
O'Connell Machinery Co.	230
Parker Mfg. Co.	230
Peacock Corp.	225
Triplex Machine Tool Corp.	226
Wigglesworth Industrial Corp.	232
Williams, Edward Hale	231



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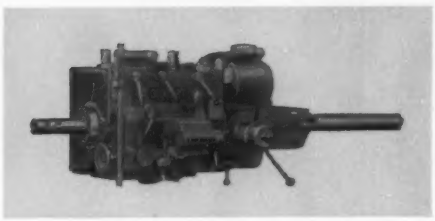

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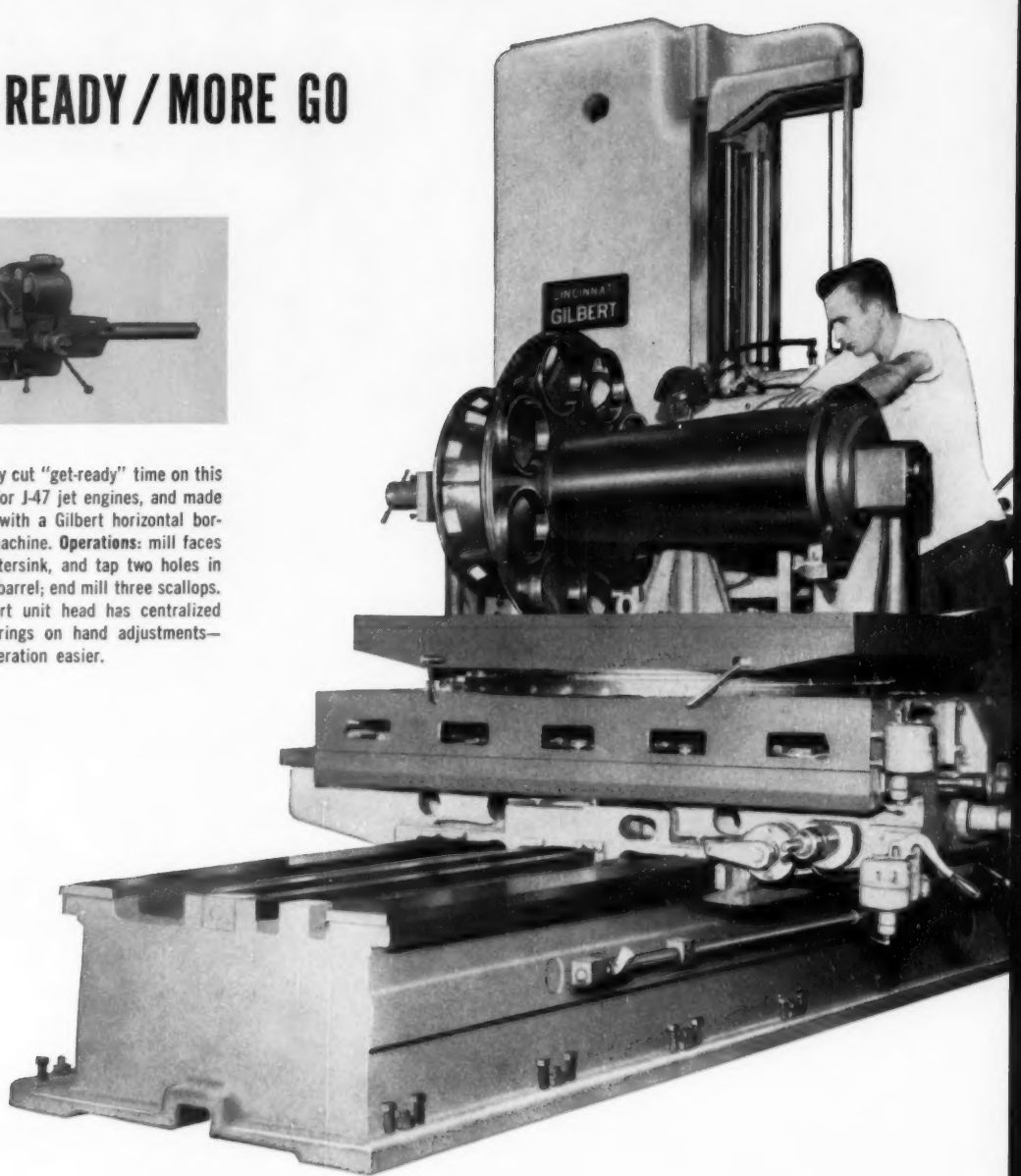

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